Vehicle Certification Agency

THE UNITED KINGDOM VEHICLE APPROVAL AUTHORITY

COMMUNICATION CONCERNING THE ~~APPROVAL GRANTED~~ (1)/ APPROVAL EXTENDED (1)/ ~~APPROVAL REFUSED~~ (1)/ ~~APPROVAL WITHDRAWN~~ (1)/ ~~PRODUCTION DEFINITELY DISCONTINUED~~ (1) OF A COMPRESSION-IGNITION ENGINE TYPE OR FAMILY OF ENGINE TYPES AS SEPARATE TECHNICAL UNITS WITH REGARD TO THE EMISSION OF POLLUTANTS PURSUANT TO REGULATION NO. 96.03

E11 Approval No: E11*96R03/00/H*2742*11

Reason(s) for extension: To cover:

1) Addition of new rating engine code 67
2) Addition of new manufacturing facility
3) Updated turbo charger part number for engine code 51

1. Trade name or mark of the engine: Caterpillar Inc.

2. Engine type(s): C15 and 2506D

2.1. Engine family: CPXL15.2ESW

2.2. Types included in the engine family: See Appendix 3 of Information Document

2.3. Tested type of engine or the representative of the engine family: IND

3. Manufacturer's name and address:

Caterpillar Inc.
100 NE Adams
Peoria, Illinois 61629
USA

4. If applicable, name and address of manufacturer's representative: Not Applicable

5. Maximum allowable intake depression: 3.7 kPa

6. Maximum allowable back pressure: 10 kPa

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Job Number: USS357966

7. Restriction of use (if any): None

8. Emission levels – final test results with DF:

	NRSC	NRTC
CO (g/kWh)	2.44	N/A (Power Band H approval)
HC (g/kWh)	0.08	N/A (Power Band H approval)
NO_x (g/kWh)	2.94	N/A (Power Band H approval)
PM (g/kWh)	0.068	N/A (Power Band H approval)

9. Engine submitted for test on: As before

10. Technical service responsible for conducting the approval test: Vehicle Certification Agency

11. Date of test report issued by that service: As before

12. Number of test report issued by that service: As before

13. Site of approval mark on the engine: Engine valve cover – on the Engine Emissions Control Label, pressure sensitive adhesive polyester label

14. Place: BRISTOL

15. Date: 28 FEBRUARY 2019

16. Signature:

D LAWLOR
Chief Technical and Statutory Operations Officer

17. The following documents, bearing the approval number shown above, are annexed to this communication:

One copy of Annex 1A or Annex 1B to this Regulation completed and with drawings and diagrams referred to attached.

Any remarks: None

(1) Strike out what does not apply.

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APPENDIX 1

Test results

1. Information concerning the conduct of the test[1]: As before

1.1. Reference fuel used for test

1.1.1. Cetane number: 54.6

1.1.2. Sulphur content: 0.02% by volume

1.1.3. Density: 835 kg/m^3

1.2. Lubricant

1.2.1. Make(s): Caterpillar

1.2.2. Type(s): DEO CH4 15W/40 CG/CH

(state percentage of oil mixture if lubricant and fuel are mixed): Not Applicable

1.3. Engine driven equipment (if applicable): Not Applicable

1.3.1 Enumeration and identifying details: Not Applicable

1.3.2 Power absorbed at indicated engine speeds (as specified by the manufacturer): Not Applicable

	Power P_{AE} (kW) absorbed at various engine speeds [(a)], taking into account Annex 7	
Equipment	*Intermediate (if applicable)*	*Rated*
Total:		

[(a)] Shall not be greater than 10 per cent of the power measured during the test.

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1.4 Engine performance

1.4.1 Engine speeds:

Idle:	700	min^{-1}
Intermediate:	1400	min^{-1}
Rated:	1800	min^{-1}

1.4.2 Engine power (2)

	Power setting (kW) at various engine speeds	
Condition	*Intermediate (if applicable)*	*Rated*
Maximum power measured on test (P_m) (kW) (a)	369.08	433.55
Total power absorbed by engine driven equipment as per paragraph 1.3.2 of this Appendix or Annex 7 (kW) (b)	0	0
Net engine power as specified in paragraph 2.1.41. (kW) (c)	369.08	433.55
c = a + b	369.08	433.55

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2. Information concerning the conduct of the NRSC test:

2.1. Dynamometer setting (kW)

	Dynamometer setting (kW) at various engine speeds	
Per cent load	*Intermediate (if applicable)*	*Rated*
10 (if applicable)	N/A	43.35
25 (if applicable)	N/A	N/A
50	184.54	216.77
75	276.81	325.16
100	369.08	433.55

2.2. Emission results of the ~~ENGINE~~/PARENT ENGINE (3)

Deterioration factor (DF): CALCULATED/~~FIXED~~ (3)

Specify the DF values and the emission results in the following table (3):

NRSC Test				
	CO	HC	NO_x	PM
DF mult/add (3)	0.27	0.0	0.0	0.006
Emissions:	CO (g/kWh)	HC (g/kWh)	NO_x (g/kWh)	PM (g/kWh)
Test result	2.17	0.08	2.94	0.062
Final test result with DF	2.44	0.08	2.94	0.068

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2.3. Sampling system used for NRSC test:

2.3.1. Gaseous emissions[4]: Figure 2

2.3.2. PM[4]: Figure 14

2.3.2.1. Method[3]: SINGLE/~~MULTIPLE FILTER~~

3. Information concerning the conduct of the NRTC test[5]: Not Applicable

3.1 Emission results of the ENGINE/PARENT ENGINE[3]: Not Applicable

Deterioration factor (DF): CALCULATED/FIXED[3]: Not Applicable

Specify the DF values and the emission results in the following table[3]:

NRTC Test				
	CO	HC	NO_x	PM
DF mult/add [3]				
Emissions:	CO (g/kWh)	HC (g/kWh)	NO_x (g/kWh)	PM (g/kWh)
Cold start				
Emissions:	CO (g/kWh)	HC (g/kWh)	NOx (g/kWh)	PM (g/kWh)
Hot start w/o regeneration				
Hot start with regeneration [3]				
$K_{r,u}$ (mult/add) [3] $K_{r,d}$ (mult/add) [3]				
Weighted test results				
Final test result with DF				

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3.2. Sampling system used for NRTC test:

Gaseous emissions[4]:

Particulates[4]:

Method[3]: SINGLE/MULTIPLE FILTER

(1) For the case of several parent engines, the following are to be indicated for each of them.

(2) Uncorrected power measured in accordance with paragraph 2.1.41.

(3) Delete as appropriate.

(4) Indicate figure numbers of system used as defined in Annex 4A, Appendix 4.

(5) In the case of several parent engines, each of them shall be indicated.

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APPROVAL NUMBER: E11*96R03/00/H*2742*11

INFORMATION PACKAGE CONTENTS

INDEX REVISION NUMBER: 01

Conformity of Production (COP) Declaration	**COP Confirmed**	
Assessment Method	**ISO/TS Cert and Control Plans COP Audit**	
Date of Initial Clearance		**Pre 2013**
Date of Last Clearance	**Aug**	**2018**

Total number of sheets: 55 (Fifty five)

Reasons for Revision: See approval certificate

Revision Date
&
Office Stamp

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Caterpillar Inc.
P.O. Box 610
Mossville, Illinois 61552-0600

November 20, 2018

Mr. Chuck Gepper
VCA North America
47 Samaritan Avenue
Ashland, OH 44805

Subject: Addendum to Type Approval No. E11 96R-032742 H

Dear Mr. Gepper:

Caterpillar Inc. requests addendum ECE Regulation No. 96 (up to and including the 03 series of amendments) Type Approval No. E11 96R-032742 H, reference Engine Family designation CPXL15.2ESW. The complete rating documentation table shown on Appendix includes the following updates highlighted in bold italics:

- Addition of new rating, engine code 67.
- Addition of new manufacturing facility in Hosur, India (COP approved per attachment).
- Updated turbo charger part number for engine code 51.

The new ratings and part numbers were tested, and conform to the Stage IIIA standards for category H engines set forth in Section 5.2.1 of R96-03.

Please contact me if you have any questions regarding the enclosed information.

Sincerely,

/ CTV

Gregory D. Hoenert
Manager, Global Emissions Certification
Large Power Systems Division (AC 6146)
Caterpillar Inc.

Telephone: (309) 578-4868
Hoenert_Gregory_D@Cat.com

Enclosures

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Confidential and In Confidence - All information and documents provided herein to the Vehicle Certification Agency are confidential and shall not be disclosed to any third party without the prior express written consent of Caterpillar.

	Engine Family	CPXL15.2ESW
1.	**General**	
1.1	Make (Name of undertaking)	Caterpillar Inc.
1.2	Type and comm. descrip. of parent and family engines	C15 or 2506D Engine Family CPXL15.2ESW
1.3	Manuf. type coding	Up to 6 alphanumeric characters
1.4	Spec. of mach. to be propelled by engine	Nonroad
1.5	Name and address of Manufacturer	Caterpillar Inc. 100 NE Adams Peoria, IL 61629 USA
	Nm. and addr. Of manuf. Authorized rep. (if any)	NA
1.6	Loc., coding and method of affixing of the eng. iden. num.	Engine Identification number on the following: on the valve cover – printed on the polyester Engine Emissions Control label; on the side of engine labels – printed on the polyester Engine Information label; and stamped on the metal tag.
1.7	Loc. and method of affixing of the EC appr. Mark	Engine valve cover – on the Engine Emissions Control label - pressure sensitive adhesive polyester label
1.8	Address(es) of assembly plant(s)	Seguin Engine Plant 1720 W Kingsbury St, Seguin, TX 78155 ***Caterpillar India Private Limited Power Systems Division Mathagondapalli , Hosur Taluk Tamil Nadu India 635114***
	Attachments	
1.1	Essential charac-teristics of the parent engine(s)	see Appendix 1
1.2	Essential charac-teristics of the engine family	see Appendix 2
1.3	Essential charac-teristics of engine types within the family	see Appendix 3
2.	Characteristics of engine-related parts of the mobile machinery (if applicable)	N/A
3.	Photographs of the parent engine	See attachment
4.	Any further attach-ments, if any:	

Appendix 1 - ESSENTIAL CHARACTERISTICS OF THE (PARENT) ENGINE
Appendix 3 - ESSENTIAL CHARACTERISTICS OF ENGINE TYPE WITHIN THE FAMILY

1.	**Descrip. of engine**	IND Parent	D8R (1)	IND (2)	365C (3)	RM500 (4)	IND (5)
1.1	Manufacturer:	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
1.2	Manufac. engine code:		1686	1687	1688	1695	1696
1.3	Cycle: four stroke / two stroke[2]:	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke
1.4	Bore (mm):	137.2	137.2	137.2	137.2	137.2	137.2
1.5	Stroke (mm):	171.4	171.4	171.4	171.4	171.4	171.4
1.6	Number and layout of cylinders:	6	6	6	6	6	6
1.7	Engine capac. (cm3):	15200	15200	15200	15200	15200	15200
1.8	Rated speed (rpm):	1800	1850	2100	1800	2000	2100
1.9	Max. torque speed (rpm):	1400	1300	1400	1400	1400	1400
1.10	Volumetric compression ratio[1]:	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1
1.11	Combustion system description:	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection
1.12	Drwg of comb. chamber and piston	See attachment	See attachment	See attachment	See attachment	See attachment	See attachment
1.13	Min cross sect. area of inlet and outlet ports:	See attachment	See attachment	See attachment	See attachment	See attachment	See attachment
1.14	**Cooling system**						
1.14.1	**Liquid**						
1.14.1.1	Nature of liquid:	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture
1.14.1.2	Circulating pump(s): yes/no[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.14.1.3	Charac. or make(s) and type(s) (if appl.):	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal
1.14.1.4	Drive ratio(s) (if applicable):	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1
1.14.2	**Air**						
1.14.2.1	Blower: yes/no[2]	No	No	No	No	No	No
1.14.2.2	Charac. or make(s) and type(s) (if appl.):	NA	NA	NA	NA	NA	NA
1.14.2.3	Drive ratio(s) (if applicable):	NA	NA	NA	NA	NA	NA
1.15	**Temp. permitted by the manufac.**						
1.15.1	Liquid cooling: Max. temp. at outlet (K):	377	377	377	377	377	377
1.15.2	Air cooling: Ref. pt.:	NA	NA	NA	NA	NA	NA
	Max. temp. at reference point (K):	NA	NA	NA	NA	NA	NA
1.15.3	Max temp of the inlet intrclr (if app) (K):	323	323	323	323	323	323
1.15.4	Max exhst temp at exit of exhst mnfld. (K):	980	925	940	937	957	958
1.15.5	Fuel temp. (K): min:	NA	NA	NA	NA	NA	NA
	Fuel temp. (K): max:	352	352	352	352	352	352
1.15.6	Lube temp. (K): min:	NA	NA	NA	NA	NA	NA
	Lube temp. (K): max:	383	383	383	383	383	383

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1.	**Descrip. of engine**	IND Parent	D8R (1)	IND (2)	365C (3)	RM500 (4)	IND (5)
1.16	**Press. charg.: y/n**[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.16.1	Make:	Garrett	Honeywell	Honeywell	Honeywell	Honeywell	Honeywell
1.16.2	Type:	2399988 2400003	3808711	2367659 2514880	3808712	3619712	2400003 2520804 3619712 3620846
1.16.3	Descrip. of syst. (eg. max press, if appl.):	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal
1.16.4	Intercooler: yes/no[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.17	Maximum inlet restr. (kPa)	3.7	3.7	3.7	3.7	3.7	3.7
1.18	Max exhst backpress. (kPa)	10	10	10	10	10	10
2.	**Measures taken against air pollution**						
2.1	Device for recycling crankcase gases: yes/no	No	No	No	No	No	No
2.2	Add. anti-poll. dev.-Descrip. and/or diag:	NA	NA	NA	NA	NA	NA
2.2.1	**Catalytic converter: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.1.1	Make:	NA	NA	NA	NA	NA	NA
2.2.1.2	Type:	NA	NA	NA	NA	NA	NA
2.2.1.3	Number of catalytic converters and elements	NA	NA	NA	NA	NA	NA
2.2.1.4	Dimensions and volume of the catalytic converter:	NA	NA	NA	NA	NA	NA
2.2.1.5	Type of catalytic action:	NA	NA	NA	NA	NA	NA
2.2.1.6	Total charge of precious metals:	NA	NA	NA	NA	NA	NA
2.2.1.7	Relative concentration:	NA	NA	NA	NA	NA	NA
2.2.1.8	Substrate (structure and material):	NA	NA	NA	NA	NA	NA
2.2.1.9	Cell density:	NA	NA	NA	NA	NA	NA
2.2.1.10	Type of casing for the catalytic converter(s):	NA	NA	NA	NA	NA	NA
2.2.1.11	Location of the catalytic converter(s) (places and max/min distances from engine):	NA	NA	NA	NA	NA	NA
2.2.1.12	Normal operating range (K):	NA	NA	NA	NA	NA	NA
2.2.1.13	Consumable reagent (where appropriate):	NA	NA	NA	NA	NA	NA
2.2.1.13.1	Type and concentration of reagent needed for catalytic action:	NA	NA	NA	NA	NA	NA
2.2.1.13.2	Normal operational temperature range of reagent (K):	NA	NA	NA	NA	NA	NA
2.2.1.13.3	International standard (where appropriate):	NA	NA	NA	NA	NA	NA
2.2.1.14	NOx sensor: yes/no[2]	NA	NA	NA	NA	NA	NA
2.2.2	**Oxygen sensor: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.2.1	Make:	NA	NA	NA	NA	NA	NA
2.2.2.2	Type	NA	NA	NA	NA	NA	NA
2.2.2.3	Location	NA	NA	NA	NA	NA	NA
2.2.3	**Air injection: yes/no**[2]	No	No	No	No	No	No
2.2.3.1	Type (pulse air, air pump, etc.):	NA	NA	NA	NA	NA	NA
2.2.4	**EGR: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.4.1	Characteristics (cooled/uncooled, high pressure/low pressure, etc.):	NA	NA	NA	NA	NA	NA
2.2.5	**Particulate trap: yes/no**	NA	NA	NA	NA	NA	NA
2.2.5.1	Dimensions and capacity of the particulate trap	NA	NA	NA	NA	NA	NA
2.2.5.2	Type and design of the particulate trap	NA	NA	NA	NA	NA	NA
2.2.5.3	Location (places and max/min distance(s) from engine):	NA	NA	NA	NA	NA	NA
2.2.5.4	Method or system of regeneration, description, and/or drawing:	NA	NA	NA	NA	NA	NA
2.2.5.5	Normal operating temperature (K) and pressure (kPa) range:	NA	NA	NA	NA	NA	NA
2.2.6	**Other systems: yes/no**	NA	NA	NA	NA	NA	NA
2.2.6.1	Description and operation:						
3.	**Fuel feed**						
3.1	**Feed pump**						
	Pressure[1] and/or char. diagram (kPa):	550 ± 117	550 ± 117	550 ± 117	550 ± 117	550 ± 117	550 ± 117

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1.	**Descrip. of engine**	IND Parent	D8R (1)	IND (2)	365C (3)	RM500 (4)	IND (5)
3.2	**Injection system**						
3.2.1	**Pump**						
3.2.1.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.1.2	Type(s):	Part no. 2530616	Part no. 3740750	Part no. 3740750	Part no. 3740750	Part no. 2530616	Part no. 2530616
3.2.1.3	Fuel Delivery:						
a	rated mm3	318	200	249	246	288	281
b	rated rpm	1800	1850	2100	1800	2000	2100
c	pk tq mm3	398	297	333	320	351	368
d	pk tq rpm	1400	1300	1400	1400	1400	1400
e	On eng./on pump bench[2]:	On engine	On engine	On engine	On engine	On engine	On engine
3.2.1.4	**Injection advance**						
3.2.1.4.1	Injec. adv. curve[1]:	Electronic	Electronic	Electronic	Electronic	Electronic	Electronic
3.2.1.4.2	Timing[1]:	Electronic	Electronic	Electronic	Electronic	Electronic	Electronic
3.2.2	**Injection piping**						
3.2.2.1	Length (mm):	NA	NA	NA	NA	NA	NA
3.2.2.2	Internal diam. (mm):	NA	NA	NA	NA	NA	NA
3.2.3	**Injector(s)**						
3.2.3.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.3.2	Type(s):	Part no. 2530616	Part no. 3740750	Part no. 3740750	Part no. 3740750	Part no. 2530616	Part no. 2530616
3.2.3.3	Opening press.[1] or charac. diag. (kPa):	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa
3.2.4	**Governor**						
3.2.4.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.4.2	Type(s):	Electronics group part no. 2409682	Electronics group part no. 2177931	Electronics group part no. 3674112	Electronics group part no. 2358222	Electronics group part no. 2197188	Electronics group part no. 3670749
3.2.4.3	Spd. where cut-off st. und. full ld (rpm)[1]:	2100 ± 10	1850 ± 10	2100 ± 10	1800 ± 10	2000 ± 10	2100 ± 10
3.2.4.4	Maximum no-load speed (rpm)[1]:	2310 ± 10	2200 ± 10	2310 ± 10	1980 ± 10	2200 ± 10	2310 ± 10
3.2.4.5	Idling speed (rpm)[1]:	700	700	700	900	1100	700
3.3	**Cold Start System[3]**						
3.3.1	Make(s):	NA	NA	NA			NA
3.3.2	Type (s):	Ether Aid	Ether Aid	Ether Aid	Ether Aid	Ether Aid	Ether Aid
3.3.3	Description:	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold
4.	**Valve Timing**						
4.1	Max. lift and angl in dead cntrs or eq. data:	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)
4.2	~~Reference and/or~~ setting ranges[2]:	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC

[1] - Specify the tolerance.
[2] - Strike out what does not apply
[3] Cold start aids:

Appendix 2 - ESSENTIAL CHARACTERISTICS OF THE ENGINE FAMILY

1.	**Common parameters:**	4 stroke water	4 stroke water	4 stroke water	4 stroke water	4 stroke water	4 stroke water
1.1	Combustion cycle:						
1.2	Cooling medium:						
1.3	Method of air aspir:	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled
1.4	Comb. cham. type/des.	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder
1.5	Valve and porting-config., size, and num.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.
1.6	Fuel system	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection
1.7	Eng. Manag. Systems						
	Prf. of ident. pursuant to dr. #'s:						
1.7.1	Chrg. cooling system:	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM
1.7.2	Exst. gas recirc.[1]	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
1.7.3	Water inj./emul. [1]:	NA	NA	NA	NA	NA	NA
1.7.4	Air injection[1]:	NA	NA	NA	NA	NA	NA
1.8	Exhaust. after-treatment system[1]:	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
	Prf. of ident. ratio:						
2.	**Engine Family Listing**						
2.1	Name of engine family:	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW
2.2	**Spec. of eng. in fam:**						
a	Engine Type	Parent	1686	1687	1688	1695	1696
b	No. of cylinders	6	6	6	6	6	6
c	Rated Speed (rpm)	1800	1850	2100	1800	2000	2100
d	Fuel del. per stroke @ rated (mm3)	318	200	249	246	288	281
e	Rated Net Power (kW)	444	259	354	323	403	403
f	Maximum power speed (min^{-1})	1800	1800	2100	1600	2000	2100
g	Maximum net power (kW)	444	271	354	325	403	403
h	Max. Torque Speed (rpm)	1400	1300	1400	1400	1400	1400
i	Fuel del. per stroke @ max. torque (mm3)	398	297	333	320	351	368
j	Max. Torque (Nm)	2719	1964	2171	2056	2355	2464
k	Low Idle Speed (rpm)	700	700	700	900	1100	700
l	Cylin. displ. (in % of parent eng.)	100%	100%	100%	100%	100%	100%

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	Engine Family
1.	**General**
1.1	Make (Name of undertaking)
1.2	Type and comm. descrip. of parent and family engines
1.3	Manuf. type coding
1.4	Spec. of mach. to be propelled by engine
1.5	Name and address of Manufacturer
	Nm. and addr. Of manuf. Authorized rep. (if any)
1.6	Loc., coding and method of affixing of the eng. iden. num.
1.7	Loc. and method of affixing of the EC appr. Mark
1.8	Address(es) of assembly plant(s)
	Attachments
1.1	Essential charac-teristics of the parent engine(s)
1.2	Essential charac-teristics of the engine family
1.3	Essential charac-teristics of engine types within the family
2.	Characteristics of engine-related parts of the mobile machinery (if applicable)
3.	Photographs of the parent engine
4.	Any further attach-ments, if any:

Appendix 1 - ESSENTIAL CHARACTERISTICS OF THE (PARENT) ENGINE
Appendix 3 - ESSENTIAL CHARACTERISTICS OF ENGINE TYPE WITHIN THE FAMILY

1.	**Descrip. of engine**	IND (5A)	IND (5B)	IND (5C)	IND (6)	IND (6A)	IND (6B)
1.1	Manufacturer:	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc. branded as Perkins	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc. branded as Perkins
1.2	Manufac. engine code:	13139	39916	48880	1697	13140	48905
1.3	Cycle: four stroke / two stroke[2]:	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke
1.4	Bore (mm):	137.2	137.2	137.2	137.2	137.2	137.2
1.5	Stroke (mm):	171.4	171.4	171.4	171.4	171.4	171.4
1.6	Number and layout of cylinders:	6	6	6	6	6	6
1.7	Engine capac. (cm3):	15200	15200	15200	15200	15200	15200
1.8	Rated speed (rpm):	2100	2100	2100	2100	2100	2100
1.9	Max. torque speed (rpm):	1400	1400	1400	1400	1400	1400
1.10	Volumetric compression ratio[1]:	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1
1.11	Combustion system description:	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection
1.12	Drwg of comb. chamber and piston	See attachment	See attachment	See attachment	See attachment	See attachment	See attachment
1.13	Min cross sect. area of inlet and outlet ports:	See attachment	See attachment	See attachment	See attachment	See attachment	See attachment
1.14	**Cooling system**						
1.14.1	**Liquid**						
1.14.1.1	Nature of liquid:	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture
1.14.1.2	Circulating pump(s): yes/no[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.14.1.3	Charac. or make(s) and type(s) (if appl.):	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal
1.14.1.4	Drive ratio(s) (if applicable):	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1
1.14.2	**Air**						
1.14.2.1	Blower: yes/no[2]	No	No	No	No	No	No
1.14.2.2	Charac. or make(s) and type(s) (if appl.):	NA	NA	NA	NA	NA	NA
1.14.2.3	Drive ratio(s) (if applicable):	NA	NA	NA	NA	NA	NA
1.15	**Temp. permitted by the manufac.**						
1.15.1	Liquid cooling: Max. temp. at outlet (K):	377	377	377	377	377	377
1.15.2	Air cooling: Ref. pt.:	NA	NA	NA	NA	NA	NA
	Max. temp. at reference point (K):	NA	NA	NA	NA	NA	NA
1.15.3	Max temp of the inlet intrclr (if app) (K):	323	323	323	323	323	323
1.15.4	Max exhst temp at exit of exhst mnfld. (K):	958	958	958	975	975	975
1.15.5	Fuel temp. (K): min:	NA	NA	NA	NA	NA	NA
	Fuel temp. (K): max:	352	352	352	352	352	352
1.15.6	Lube temp. (K): min:	NA	NA	NA	NA	NA	NA
	Lube temp. (K): max:	383	383	383	383	383	383

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1.	**Descrip. of engine**	IND (5A)	IND (5B)	IND (5C)	IND (6)	IND (6A)	IND (6B)
1.16	**Press. charg.: y/n**[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.16.1	Make:	Honeywell	Honeywell	Honeywell	Honeywell	Honeywell	Honeywell
1.16.2	Type:	2400003 2520804 3619712 3620846	2400003 2520804 3619712 3620846	2400003 2520804 3619712 3620846	2400003 2520804 3619712 3620846	2400003 2520804 3619712 3620846	2400003 2520804 3619712 3620846
1.16.3	Descrip. of syst. (eg. max press, if appl.):	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal
1.16.4	Intercooler: yes/no[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.17	Maximum inlet restr. (kPa)	3.7	3.7	3.7	3.7	3.7	3.7
1.18	Max exhst backpress. (kPa)	10	10	10	10	10	10
2.	**Measures taken against air pollution**						
2.1	Device for recycling crankcase gases: yes/no	No	No	No	No	No	No
2.2	Add. anti-poll. dev.-Descrip. and/or diag:	NA	NA	NA	NA	NA	NA
2.2.1	**Catalytic converter: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.1.1	Make:	NA	NA	NA	NA	NA	NA
2.2.1.2	Type:	NA	NA	NA	NA	NA	NA
2.2.1.3	Number of catalytic converters and elements	NA	NA	NA	NA	NA	NA
2.2.1.4	Dimensions and volume of the catalytic converter:	NA	NA	NA	NA	NA	NA
2.2.1.5	Type of catalytic action:	NA	NA	NA	NA	NA	NA
2.2.1.6	Total charge of precious metals:	NA	NA	NA	NA	NA	NA
2.2.1.7	Relative concentration:	NA	NA	NA	NA	NA	NA
2.2.1.8	Substrate (structure and material):	NA	NA	NA	NA	NA	NA
2.2.1.9	Cell density:	NA	NA	NA	NA	NA	NA
2.2.1.10	Type of casing for the catalytic converter(s):	NA	NA	NA	NA	NA	NA
2.2.1.11	Location of the catalytic converter(s) (places and max/min distances from engine):	NA	NA	NA	NA	NA	NA
2.2.1.12	Normal operating range (K):	NA	NA	NA	NA	NA	NA
2.2.1.13	Consumable reagent (where appropriate):	NA	NA	NA	NA	NA	NA
2.2.1.13.1	Type and concentration of reagent needed for catalytic action:	NA	NA	NA	NA	NA	NA
2.2.1.13.2	Normal operational temperature range of reagent (K):	NA	NA	NA	NA	NA	NA
2.2.1.13.3	International standard (where appropriate):	NA	NA	NA	NA	NA	NA
2.2.1.14	NOx sensor: yes/no[2]	NA	NA	NA	NA	NA	NA
2.2.2	**Oxygen sensor: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.2.1	Make:	NA	NA	NA	NA	NA	NA
2.2.2.2	Type	NA	NA	NA	NA	NA	NA
2.2.2.3	Location	NA	NA	NA	NA	NA	NA
2.2.3	**Air injection: yes/no**[2]	No	No	No	No	No	No
2.2.3.1	Type (pulse air, air pump, etc.):	NA	NA	NA	NA	NA	NA
2.2.4	**EGR: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.4.1	Characteristics (cooled/uncooled, high pressure/low pressure, etc.):	NA	NA	NA	NA	NA	NA
2.2.5	**Particulate trap: yes/no**	NA	NA	NA	NA	NA	NA
2.2.5.1	Dimensions and capacity of the particulate trap	NA	NA	NA	NA	NA	NA
2.2.5.2	Type and design of the particulate trap	NA	NA	NA	NA	NA	NA
2.2.5.3	Location (places and max/min distance(s) from engine):	NA	NA	NA	NA	NA	NA
2.2.5.4	Method or system of regeneration, description, and/or drawing:	NA	NA	NA	NA	NA	NA
2.2.5.5	Normal operating temperature (K) and pressure (kPa) range:	NA	NA	NA	NA	NA	NA
2.2.6	**Other systems: yes/no**	NA	NA	NA	NA	NA	NA
2.2.6.1	Description and operation:						
3.	**Fuel feed**						
3.1	**Feed pump**						
	Pressure[1] and/or char. diagram (kPa):	550 ± 117	550 ± 117	550 ± 117	550 ± 117	550 ± 117	550 ± 117

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1.	**Descrip. of engine**	IND (5A)	IND (5B)	IND (5C)	IND (6)	IND (6A)	IND (6B)
3.2	**Injection system**						
3.2.1	**Pump**						
3.2.1.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.1.2	Type(s):	Part no. 2530616	Part no. 2530616	Part no. 5104139	Part no. 2530616	Part no. 2530616	Part no. 5104139
3.2.1.3	Fuel Delivery:						
a	rated mm3	281	281	281	309	309	309
b	rated rpm	2100	2100	2100	2100	2100	2100
c	pk tq mm3	368	368	368	389	389	389
d	pk tq rpm	1400	1400	1400	1400	1400	1400
e	On eng./on pump bench[2]:	On engine	On engine	On engine	On engine	On engine	On engine
3.2.1.4	**Injection advance**						
3.2.1.4.1	Injec. adv. curve[1]:	Electronic	Electronic	Electronic	Electronic	Electronic	Electronic
3.2.1.4.2	Timing[1]:	Electronic	Electronic	Electronic	Electronic	Electronic	Electronic
3.2.2	**Injection piping**						
3.2.2.1	Length (mm):	NA	NA	NA	NA	NA	NA
3.2.2.2	Internal diam. (mm):	NA	NA	NA	NA	NA	NA
3.2.3	**Injector(s)**						
3.2.3.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.3.2	Type(s):	Part no. 2530616	Part no. 2530616	Part no. 5104139	Part no. 2530616	Part no. 2530616	Part no. 5104139
3.2.3.3	Opening press.[1] or charac. diag. (kPa):	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa
3.2.4	**Governor**						
3.2.4.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.4.2	Type(s):	Electronics group part no. 3819594	Electronics group part no. 4878734	Electronics group part no. 5058744	Electronics group part no. 3670749	Electronics group part no. 3819594	Electronics group part no. 5058744
3.2.4.3	Spd. where cut-off st. und. full ld (rpm)[1]:	2100 ± 10	2100 ± 10	2100 ± 10	2100 ± 10	2100 ± 10	2100 ± 10
3.2.4.4	Maximum no-load speed (rpm)[1]:	2310 ± 10	2310 ± 10	2310 ± 10	2310 ± 10	2310 ± 10	2310 ± 10
3.2.4.5	Idling speed (rpm)[1]:	700	700	700	700	700	700
3.3	**Cold Start System[3]**						
3.3.1	Make(s):	NA	NA	NA	NA	NA	NA
3.3.2	Type (s):	Ether Aid	Ether Aid	Ether Aid	Ether Aid	Ether Aid	Ether Aid
3.3.3	Description:	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold
4.	**Valve Timing**						
4.1	Max. lift and angl in dead cntrs or eq. data:	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)
4.2	~~Reference and/or~~ setting ranges[2]:	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC

[1] - Specify the tolerance.
[2] - Strike out what does not apply
[3] Cold start aids:

Appendix 2 - ESSENTIAL CHARACTERISTICS OF THE ENGINE FAMILY

1.	**Common parameters:**						
1.1	Combustion cycle:	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke
1.2	Cooling medium:	water	water	water	water	water	water
1.3	Method of air aspir:	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled
1.4	Comb. cham. type/des.	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder
1.5	Valve and porting-config., size, and num.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.
1.6	Fuel system	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection
1.7	Eng. Manag. Systems						
	Prf. of ident. pursuant to dr. #'s:						
1.7.1	Chrg. cooling system:	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM
1.7.2	Exst. gas recirc.[1]	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
1.7.3	Water inj./emul.[1]:	NA	NA	NA	NA	NA	NA
1.7.4	Air injection[1]:	NA	NA	NA	NA	NA	NA
1.8	Exhaust. after-treatment system[1]:	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
	Prf. of ident. ratio:						
2.	**Engine Family Listing**						
2.1	Name of engine family:	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW
2.2	**Spec. of eng. in fam:**						
a	Engine Type	13139	39916	48880	1697	13140	48905
b	No. of cylinders	6	6	6	6	6	6
c	Rated Speed (rpm)	2100	2100	2100	2100	2100	2100
d	Fuel del. per stroke @ rated (mm3)	281	281	281	309	309	309
e	Rated Net Power (kW)	403	403	403	432.5	432.5	432.5
f	Maximum power speed (min^{-1})	2100	2100	2100	2100	2100	2100
g	Maximum net power (kW)	403	403	403	432.5	432.5	432.5
h	Max. Torque Speed (rpm)	1400	1400	1400	1400	1400	1400
i	Fuel del. per stroke @ max. torque (mm3)	368	368	368	389	389	389
j	Max. Torque (Nm)	2464	2464	2464	2649	2649	2649
k	Low Idle Speed (rpm)	700	700	700	700	700	700
l	Cylin. displ. (in % of parent eng.)	100%	100%	100%	100%	100%	100%

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	Engine Family
1.	**General**
1.1	Make (Name of undertaking)
1.2	Type and comm. descrip. of parent and family engines
1.3	Manuf. type coding
1.4	Spec. of mach. to be propelled by engine
1.5	Name and address of Manufacturer
	Nm. and addr. Of manuf. Authorized rep. (if any)
1.6	Loc., coding and method of affixing of the eng. iden. num.
1.7	Loc. and method of affixing of the EC appr. Mark
1.8	Address(es) of assembly plant(s)
	Attachments
1.1	Essential charac-teristics of the parent engine(s)
1.2	Essential charac-teristics of the engine family
1.3	Essential charac-teristics of engine types within the family
2.	Characteristics of engine-related parts of the mobile machinery (if applicable)
3.	Photographs of the parent engine
4.	Any further attach-ments, if any:

Appendix 1 - ESSENTIAL CHARACTERISTICS OF THE (PARENT) ENGINE
Appendix 3 - ESSENTIAL CHARACTERISTICS OF ENGINE TYPE WITHIN THE FAMILY

1.	**Descrip. of engine**	IND (7)	IND (7A)	IND (7B)	824/5/6H (8)	824/5/6H (9)	735 (10)
1.1	Manufacturer:	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc. branded as Perkins	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
1.2	Manufac. engine code:	1698	13141	48918	1699	1700	1701
1.3	Cycle: four stroke / two stroke[2]:	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke
1.4	Bore (mm):	137.2	137.2	137.2	137.2	137.2	137.2
1.5	Stroke (mm):	171.4	171.4	171.4	171.4	171.4	171.4
1.6	Number and layout of cylinders:	6	6	6	6	6	6
1.7	Engine capac. (cm3):	15200	15200	15200	15200	15200	15200
1.8	Rated speed (rpm):	2100	2100	2100	1800	1800	1900
1.9	Max. torque speed (rpm):	1400	1400	1400	1250	1250	1200
1.10	Volumetric compression ratio[1]:	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1
1.11	Combustion system description:	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection
1.12	Drwg of comb. chamber and piston	See attachment	See attachment	See attachment	See attachment	See attachment	See attachment
1.13	Min cross sect. area of inlet and outlet ports:	See attachment	See attachment	See attachment	See attachment	See attachment	See attachment
1.14	**Cooling system**						
1.14.1	**Liquid**						
1.14.1.1	Nature of liquid:	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture
1.14.1.2	Circulating pump(s): yes/no[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.14.1.3	Charac. or make(s) and type(s) (if appl.):	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal
1.14.1.4	Drive ratio(s) (if applicable):	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1
1.14.2	**Air**						
1.14.2.1	Blower: yes/no[2]	No	No	No	No	No	No
1.14.2.2	Charac. or make(s) and type(s) (if appl.):	NA	NA	NA	NA	NA	NA
1.14.2.3	Drive ratio(s) (if applicable):	NA	NA	NA	NA	NA	NA
1.15	**Temp. permitted by the manufac.**						
1.15.1	Liquid cooling: Max. temp. at outlet (K):	377	377	377	377	377	377
1.15.2	Air cooling: Ref. pt.:	NA	NA	NA	NA	NA	NA
	Max. temp. at reference point (K):	NA	NA	NA	NA	NA	NA
1.15.3	Max temp of the inlet intrclr (if app) (K):	323	323	323	323	323	323
1.15.4	Max exhst temp at exit of exhst mnfld. (K):	980	980	980	902	892	911
1.15.5	Fuel temp. (K): min:	NA	NA	NA	NA	NA	NA
	Fuel temp. (K): max:	352	352	352	352	352	352
1.15.6	Lube temp. (K): min:	NA	NA	NA	NA	NA	NA
	Lube temp. (K): max:	383	383	383	383	383	383

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1.	**Descrip. of engine**	IND (7)	IND (7A)	IND (7B)	824/5/6H (8)	824/5/6H (9)	735 (10)
1.16	**Press. charg.: y/n**[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.16.1	Make:	Honeywell	Honeywell	Honeywell	Honeywell	Honeywell	Honeywell
1.16.2	Type:	2400003 2520804 3619712 3620846	2400003 2520804 3619712 3620846	2400003 2520804 3619712 3620846	3827899	3827899	3620857
1.16.3	Descrip. of syst. (eg. max press, if appl.):	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal
1.16.4	Intercooler: yes/no[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.17	Maximum inlet restr. (kPa)	3.7	3.7	3.7	3.7	3.7	3.7
1.18	Max exhst backpress. (kPa)	10	10	10	10	10	10
2.	**Measures taken against air pollution**						
2.1	Device for recycling crankcase gases: yes/no	No	No	No	No	No	No
2.2	Add. anti-poll. dev.-Descrip. and/or diag:	NA	NA	NA	NA	NA	NA
2.2.1	**Catalytic converter: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.1.1	Make:	NA	NA	NA	NA	NA	NA
2.2.1.2	Type:	NA	NA	NA	NA	NA	NA
2.2.1.3	Number of catalytic converters and elements	NA	NA	NA	NA	NA	NA
2.2.1.4	Dimensions and volume of the catalytic converter:	NA	NA	NA	NA	NA	NA
2.2.1.5	Type of catalytic action:	NA	NA	NA	NA	NA	NA
2.2.1.6	Total charge of precious metals:	NA	NA	NA	NA	NA	NA
2.2.1.7	Relative concentration:	NA	NA	NA	NA	NA	NA
2.2.1.8	Substrate (structure and material):	NA	NA	NA	NA	NA	NA
2.2.1.9	Cell density:	NA	NA	NA	NA	NA	NA
2.2.1.10	Type of casing for the catalytic converter(s):	NA	NA	NA	NA	NA	NA
2.2.1.11	Location of the catalytic converter(s) (places and max/min distances from engine):	NA	NA	NA	NA	NA	NA
2.2.1.12	Normal operating range (K):	NA	NA	NA	NA	NA	NA
2.2.1.13	Consumable reagent (where appropriate):	NA	NA	NA	NA	NA	NA
2.2.1.13.1	Type and concentration of reagent needed for catalytic action:	NA	NA	NA	NA	NA	NA
2.2.1.13.2	Normal operational temperature range of reagent (K):	NA	NA	NA	NA	NA	NA
2.2.1.13.3	International standard (where appropriate):	NA	NA	NA	NA	NA	NA
2.2.1.14	NOx sensor: yes/no[2]	NA	NA	NA	NA	NA	NA
2.2.2	**Oxygen sensor: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.2.1	Make:	NA	NA	NA	NA	NA	NA
2.2.2.2	Type	NA	NA	NA	NA	NA	NA
2.2.2.3	Location	NA	NA	NA	NA	NA	NA
2.2.3	**Air injection: yes/no**[2]	No	No	No	No	No	No
2.2.3.1	Type (pulse air, air pump, etc.):	NA	NA	NA	NA	NA	NA
2.2.4	**EGR: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.4.1	Characteristics (cooled/uncooled, high pressure/low pressure, etc.):	NA	NA	NA	NA	NA	NA
2.2.5	**Particulate trap: yes/no**	NA	NA	NA	NA	NA	NA
2.2.5.1	Dimensions and capacity of the particulate trap	NA	NA	NA	NA	NA	NA
2.2.5.2	Type and design of the particulate trap	NA	NA	NA	NA	NA	NA
2.2.5.3	Location (places and max/min distance(s) from engine):	NA	NA	NA	NA	NA	NA
2.2.5.4	Method or system of regeneration, description, and/or drawing:	NA	NA	NA	NA	NA	NA
2.2.5.5	Normal operating temperature (K) and pressure (kPa) range:	NA	NA	NA	NA	NA	NA
2.2.6	**Other systems: yes/no**	NA	NA	NA	NA	NA	NA
2.2.6.1	Description and operation:						
3.	**Fuel feed**						
3.1	**Feed pump**						
	Pressure[1] and/or char. diagram (kPa):	550 ± 117	550 ± 117	550 ± 117	550 ± 117	550 ± 117	550 ± 117

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1.	**Descrip. of engine**	IND (7)	IND (7A)	IND (7B)	824/5/6H (8)	824/5/6H (9)	735 (10)
3.2	**Injection system**						
3.2.1	**Pump**						
3.2.1.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.1.2	Type(s):	Part no. 2530616	Part no. 2530616	Part no. 5104139	Part no. 3740750	Part no. 3740750	Part no. 3740750
3.2.1.3	Fuel Delivery:						
a	rated mm3	318	318	318	235	219	220
b	rated rpm	2100	2100	2100	1800	1800	1900
c	pk tq mm3	398	398	398	290	278	304
d	pk tq rpm	1400	1400	1400	1250	1250	1200
e	On eng./on pump bench[2]:	On engine	On engine	On engine	On engine	On engine	On engine
3.2.1.4	**Injection advance**						
3.2.1.4.1	Injec. adv. curve[1]:	Electronic	Electronic	Electronic	Electronic	Electronic	Electronic
3.2.1.4.2	Timing[1]:	Electronic	Electronic	Electronic	Electronic	Electronic	Electronic
3.2.2	**Injection piping**						
3.2.2.1	Length (mm):	NA	NA	NA	NA	NA	NA
3.2.2.2	Internal diam. (mm):	NA	NA	NA	NA	NA	NA
3.2.3	**Injector(s)**						
3.2.3.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.3.2	Type(s):	Part no. 2530616	Part no. 2530616	Part no. 5104139	Part no. 3740750	Part no. 3740750	Part no. 3740750
3.2.3.3	Opening press.[1] or charac. diag. (kPa):	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa
3.2.4	**Governor**						
3.2.4.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.4.2	Type(s):	Electronics group part no. 3670749	Electronics group part no. 3819594	Electronics group part no. 5058744	Electronics group part no. 2264733	Electronics group part no. 2264733	Electronics group part no. 2331771
3.2.4.3	Spd. where cut-off st. und. full ld (rpm)[1]:	2100 ± 10	2100 ± 10	2100 ± 10	1800 ± 10	1800 ± 10	1900 ± 10
3.2.4.4	Maximum no-load speed (rpm)[1]:	2310 ± 10	2310 ± 10	2310 ± 10	2200 ± 10	2200 ± 10	2105 ± 10
3.2.4.5	Idling speed (rpm)[1]:	700	700	700	800	800	700
3.3	**Cold Start System[3]**						
3.3.1	Make(s):	NA	NA	NA	NA	NA	NA
3.3.2	Type (s):	Ether Aid	Ether Aid	Ether Aid	Ether Aid	Ether Aid	Ether Aid
3.3.3	Description:	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold
4.	**Valve Timing**						
4.1	Max. lift and angl in dead cntrs or eq. data:	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)
4.2	~~Reference and/or~~ setting ranges[2]:	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC

[1] - Specify the tolerance.
[2] - Strike out what does not apply
[3] Cold start aids:

Appendix 2 - ESSENTIAL CHARACTERISTICS OF THE ENGINE FAMILY

1.	**Common parameters:**						
1.1	Combustion cycle:	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke
1.2	Cooling medium:	water	water	water	water	water	water
1.3	Method of air aspir:	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled
1.4	Comb. cham. type/des.	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder
1.5	Valve and porting-config., size, and num.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.
1.6	Fuel system	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection
1.7	Eng. Manag. Systems						
	Prf. of ident. pursuant to dr. #'s:						
1.7.1	Chrg. cooling system:	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM
1.7.2	Exst. gas recirc.[1]	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
1.7.3	Water inj./emul. [1]:	NA	NA	NA	NA	NA	NA
1.7.4	Air injection[1]:	NA	NA	NA	NA	NA	NA
1.8	Exhaust. after-treatment system[1]:	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
	Prf. of ident. ratio:						
2.	**Engine Family Listing**						
2.1	Name of engine family:	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW
2.2	**Spec. of eng. in fam:**						
a	Engine Type	1698	13141	48918	1699	1700	1701
b	No. of cylinders	6	6	6	6	6	6
c	Rated Speed (rpm)	2100	2100	2100	1800	1800	1900
d	Fuel del. per stroke @ rated (mm3)	318	318	318	235	219	220
e	Rated Net Power (kW)	444	444	444	299	280	299
f	Maximum power speed (min^{-1})	2100	2100	2100	1800	1800	1900
g	Maximum net power (kW)	444	444	444	299	280	299
h	Max. Torque Speed (rpm)	1400	1400	1400	1250	1250	1200
i	Fuel del. per stroke @ max. torque (mm3)	398	398	398	290	278	304
j	Max. Torque (Nm)	2719	2719	2719	1881	1836	1950
k	Low Idle Speed (rpm)	700	700	700	800	800	700
l	Cylin. displ. (in % of parent eng.)	100%	100%	100%	100%	100%	100%

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	Engine Family
1.	**General**
1.1	Make (Name of undertaking)
1.2	Type and comm. descrip. of parent and family engines
1.3	Manuf. type coding
1.4	Spec. of mach. to be propelled by engine
1.5	Name and address of Manufacturer
	Nm. and addr. Of manuf. Authorized rep. (if any)
1.6	Loc., coding and method of affixing of the eng. iden. num.
1.7	Loc. and method of affixing of the EC appr. Mark
1.8	Address(es) of assembly plant(s)
	Attachments
1.1	Essential charac-teristics of the parent engine(s)
1.2	Essential charac-teristics of the engine family
1.3	Essential charac-teristics of engine types within the family
2.	Characteristics of engine-related parts of the mobile machinery (if applicable)
3.	Photographs of the parent engine
4.	Any further attach-ments, if any:

Appendix 1 - ESSENTIAL CHARACTERISTICS OF THE (PARENT) ENGINE
Appendix 3 - ESSENTIAL CHARACTERISTICS OF ENGINE TYPE WITHIN THE FAMILY

1.	**Descrip. of engine**	735 (11)	735 (12)	735 (13)	627G (14)	627G (15)	980H (16)
1.1	Manufacturer:	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
1.2	Manufac. engine code:	1702	1703	1704	1705	1706	1707
1.3	Cycle: four stroke / two stroke[2]:	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke
1.4	Bore (mm):	137.2	137.2	137.2	137.2	137.2	137.2
1.5	Stroke (mm):	171.4	171.4	171.4	171.4	171.4	171.4
1.6	Number and layout of cylinders:	6	6	6	6	6	6
1.7	Engine capac. (cm3):	15200	15200	15200	15200	15200	15200
1.8	Rated speed (rpm):	1700	1700	1700	1800	1800	1800
1.9	Max. torque speed (rpm):	1200	1200	1200	1200	1200	1200
1.10	Volumetric compression ratio[1]:	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1
1.11	Combustion system description:	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection
1.12	Drwg of comb. chamber and piston	See attachment	See attachment	See attachment	See attachment	See attachment	See attachment
1.13	Min cross sect. area of inlet and outlet ports:	See attachment	See attachment	See attachment	See attachment	See attachment	See attachment
1.14	**Cooling system**						
1.14.1	**Liquid**						
1.14.1.1	Nature of liquid:	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture
1.14.1.2	Circulating pump(s): yes/no[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.14.1.3	Charac. or make(s) and type(s) (if appl.):	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal
1.14.1.4	Drive ratio(s) (if applicable):	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1
1.14.2	**Air**						
1.14.2.1	Blower: yes/no[2]	No	No	No	No	No	No
1.14.2.2	Charac. or make(s) and type(s) (if appl.):	NA	NA	NA	NA	NA	NA
1.14.2.3	Drive ratio(s) (if applicable):	NA	NA	NA	NA	NA	NA
1.15	**Temp. permitted by the manufac.**						
1.15.1	Liquid cooling: Max. temp. at outlet (K):	377	377	377	377	377	377
1.15.2	Air cooling: Ref. pt.:	NA	NA	NA	NA	NA	NA
	Max. temp. at reference point (K):	NA	NA	NA	NA	NA	NA
1.15.3	Max temp of the inlet intrclr (if app) (K):	323	323	323	323	323	323
1.15.4	Max exhst temp at exit of exhst mnfld. (K):	946	927	925	927	884	886
1.15.5	Fuel temp. (K): min:	NA	NA	NA	NA	NA	NA
	Fuel temp. (K): max:	352	352	352	352	352	352
1.15.6	Lube temp. (K): min:	NA	NA	NA	NA	NA	NA
	Lube temp. (K): max:	383	383	383	383	383	383

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1.	**Descrip. of engine**	735 (11)	735 (12)	735 (13)	627G (14)	627G (15)	980H (16)
1.16	**Press. charg.: y/n**[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.16.1	Make:	Honeywell	Honeywell	Honeywell	Honeywell	Honeywell	Honeywell
1.16.2	Type:	3620857	3620857	3620857	3808708	3808708	3827898
1.16.3	Descrip. of syst. (eg. max press, if appl.):	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal
1.16.4	Intercooler: yes/no[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.17	Maximum inlet restr. (kPa)	3.7	3.7	3.7	3.7	3.7	3.7
1.18	Max exhst backpress. (kPa)	10	10	10	10	10	10
2.	**Measures taken against air pollution**						
2.1	Device for recycling crankcase gases: yes/no	No	No	No	No	No	No
2.2	Add. anti-poll. dev.-Descrip. and/or diag:	NA	NA	NA	NA	NA	NA
2.2.1	**Catalytic converter: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.1.1	Make:	NA	NA	NA	NA	NA	NA
2.2.1.2	Type:	NA	NA	NA	NA	NA	NA
2.2.1.3	Number of catalytic converters and elements	NA	NA	NA	NA	NA	NA
2.2.1.4	Dimensions and volume of the catalytic converter:	NA	NA	NA	NA	NA	NA
2.2.1.5	Type of catalytic action:	NA	NA	NA	NA	NA	NA
2.2.1.6	Total charge of precious metals:	NA	NA	NA	NA	NA	NA
2.2.1.7	Relative concentration:	NA	NA	NA	NA	NA	NA
2.2.1.8	Substrate (structure and material):	NA	NA	NA	NA	NA	NA
2.2.1.9	Cell density:	NA	NA	NA	NA	NA	NA
2.2.1.10	Type of casing for the catalytic converter(s):	NA	NA	NA	NA	NA	NA
2.2.1.11	Location of the catalytic converter(s) (places and max/min distances from engine):	NA	NA	NA	NA	NA	NA
2.2.1.12	Normal operating range (K):	NA	NA	NA	NA	NA	NA
2.2.1.13	Consumable reagent (where appropriate):	NA	NA	NA	NA	NA	NA
2.2.1.13.1	Type and concentration of reagent needed for catalytic action:	NA	NA	NA	NA	NA	NA
2.2.1.13.2	Normal operational temperature range of reagent (K):	NA	NA	NA	NA	NA	NA
2.2.1.13.3	International standard (where appropriate):	NA	NA	NA	NA	NA	NA
2.2.1.14	NOx sensor: yes/no[2]	NA	NA	NA	NA	NA	NA
2.2.2	**Oxygen sensor: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.2.1	Make:	NA	NA	NA	NA	NA	NA
2.2.2.2	Type	NA	NA	NA	NA	NA	NA
2.2.2.3	Location	NA	NA	NA	NA	NA	NA
2.2.3	**Air injection: yes/no**[2]	No	No	No	No	No	No
2.2.3.1	Type (pulse air, air pump, etc.):	NA	NA	NA	NA	NA	NA
2.2.4	**EGR: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.4.1	Characteristics (cooled/uncooled, high pressure/low pressure, etc.):	NA	NA	NA	NA	NA	NA
2.2.5	**Particulate trap: yes/no**	NA	NA	NA	NA	NA	NA
2.2.5.1	Dimensions and capacity of the particulate trap	NA	NA	NA	NA	NA	NA
2.2.5.2	Type and design of the particulate trap	NA	NA	NA	NA	NA	NA
2.2.5.3	Location (places and max/min distance(s) from engine):	NA	NA	NA	NA	NA	NA
2.2.5.4	Method or system of regeneration, description, and/or drawing:	NA	NA	NA	NA	NA	NA
2.2.5.5	Normal operating temperature (K) and pressure (kPa) range:	NA	NA	NA	NA	NA	NA
2.2.6	**Other systems: yes/no**	NA	NA	NA	NA	NA	NA
2.2.6.1	Description and operation:						
3.	**Fuel feed**						
3.1	**Feed pump**						
	Pressure[1] and/or char. diagram (kPa):	550 ± 117	550 ± 117	550 ± 117	550 ± 117	550 ± 117	550 ± 117

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1.	**Descrip. of engine**	735 (11)	735 (12)	735 (13)	627G (14)	627G (15)	980H (16)
3.2	**Injection system**						
3.2.1	**Pump**						
3.2.1.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.1.2	Type(s):	Part no. 3740750	Part no. 3740750	Part no. 3740750	Part no. 3740750	Part no. 3740750	Part no. 3740750
3.2.1.3	Fuel Delivery:						
a	rated mm3	247	232	221	231	210	210
b	rated rpm	1700	1700	1700	1800	1800	1800
c	pk tq mm3	336	311	299	308	269	273
d	pk tq rpm	1200	1200	1200	1200	1200	1200
e	On eng./on pump bench[2]:	On engine	On engine	On engine	On engine	On engine	On engine
3.2.1.4	**Injection advance**						
3.2.1.4.1	Injec. adv. curve[1]:	Electronic	Electronic	Electronic	Electronic	Electronic	Electronic
3.2.1.4.2	Timing[1]:	Electronic	Electronic	Electronic	Electronic	Electronic	Electronic
3.2.2	**Injection piping**						
3.2.2.1	Length (mm):	NA	NA	NA	NA	NA	NA
3.2.2.2	Internal diam. (mm):	NA	NA	NA	NA	NA	NA
3.2.3	**Injector(s)**						
3.2.3.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.3.2	Type(s):	Part no. 3740750	Part no. 3740750	Part no. 3740750	Part no. 3740750	Part no. 3740750	Part no. 3740750
3.2.3.3	Opening press.[1] or charac. diag. (kPa):	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa
3.2.4	**Governor**						
3.2.4.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.4.2	Type(s):	Electronics group part no. 2331771	Electronics group part no. 2331771	Electronics group part no. 2331771	Electronics group part no. 2271396	Electronics group part no. 2271396	Electronics group part no. 2268790
3.2.4.3	Spd. where cut-off st. und. full ld (rpm)[1]:	1700 ± 10	1700 ± 10	1700 ± 10	1800 ± 10	1800 ± 10	1800 ± 10
3.2.4.4	Maximum no-load speed (rpm)[1]:	2105 ± 10	2105 ± 10	2105 ± 10	2100 ± 10	2100 ± 10	2200 ± 10
3.2.4.5	Idling speed (rpm)[1]:	700	700	700	700	700	800
3.3	**Cold Start System[3]**						
3.3.1	Make(s):	NA	NA	NA	NA	NA	NA
3.3.2	Type (s):	Ether Aid	Ether Aid	Ether Aid	Ether Aid	Ether Aid	Ether Aid
3.3.3	Description:	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold
4.	**Valve Timing**						
4.1	Max. lift and angl in dead cntrs or eq. data:	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)
4.2	~~Reference and/or~~ setting ranges[2]:	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC

[1] - Specify the tolerance.
[2] - Strike out what does not apply
[3] Cold start aids:

Appendix 2 - ESSENTIAL CHARACTERISTICS OF THE ENGINE FAMILY

1.	**Common parameters:**						
1.1	Combustion cycle:	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke
1.2	Cooling medium:	water	water	water	water	water	water
1.3	Method of air aspir:	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled
1.4	Comb. cham. type/des.	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder
1.5	Valve and porting-config., size, and num.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.
1.6	Fuel system	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection
1.7	Eng. Manag. Systems						
	Prf. of ident. pursuant to dr. #'s:						
1.7.1	Chrg. cooling system:	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM
1.7.2	Exst. gas recirc.[1]	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
1.7.3	Water inj./emul. [1]:	NA	NA	NA	NA	NA	NA
1.7.4	Air injection[1]:	NA	NA	NA	NA	NA	NA
1.8	Exhaust. after-treatment system[1]:	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
	Prf. of ident. ratio:						
2.	**Engine Family Listing**						
2.1	Name of engine family:	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW
2.2	**Spec. of eng. in fam:**						
a	Engine Type	1702	1703	1704	1705	1706	1707
b	No. of cylinders	6	6	6	6	6	6
c	Rated Speed (rpm)	1700	1700	1700	1800	1800	1800
d	Fuel del. per stroke @ rated (mm3)	247	232	221	231	210	210
e	Rated Net Power (kW)	304	289.5	275	294	268	264
f	Maximum power speed (min^{-1})	1700	1700	1700	1800	1800	1900
g	Maximum net power (kW)	304	289.5	275	294	268	270
h	Max. Torque Speed (rpm)	1200	1200	1200	1200	1200	1200
i	Fuel del. per stroke @ max. torque (mm3)	336	311	299	308	269	273
j	Max. Torque (Nm)	2155	2050	1945	2031	1744	1742
k	Low Idle Speed (rpm)	700	700	700	700	700	800
l	Cylin. displ. (in % of parent eng.)	100%	100%	100%	100%	100%	100%

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	Engine Family
1.	**General**
1.1	Make (Name of undertaking)
1.2	Type and comm. descrip. of parent and family engines
1.3	Manuf. type coding
1.4	Spec. of mach. to be propelled by engine
1.5	Name and address of Manufacturer
	Nm. and addr. Of manuf. Authorized rep. (if any)
1.6	Loc., coding and method of affixing of the eng. iden. num.
1.7	Loc. and method of affixing of the EC appr. Mark
1.8	Address(es) of assembly plant(s)
	Attachments
1.1	Essential charac-teristics of the parent engine(s)
1.2	Essential charac-teristics of the engine family
1.3	Essential charac-teristics of engine types within the family
2.	Characteristics of engine-related parts of the mobile machinery (if applicable)
3.	Photographs of the parent engine
4.	Any further attach-ments, if any:

Appendix 1 - ESSENTIAL CHARACTERISTICS OF THE (PARENT) ENGINE
Appendix 3 - ESSENTIAL CHARACTERISTICS OF ENGINE TYPE WITHIN THE FAMILY

1.	**Descrip. of engine**	980H (17)	D8T (18)	IND (19)	IND (20)	583T (21)	657G (22)
1.1	Manufacturer:	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
1.2	Manufac. engine code:	1708	1709	1711	1712	1714	1724
1.3	Cycle: four stroke / two stroke[2]:	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke
1.4	Bore (mm):	137.2	137.2	137.2	137.2	137.2	137.2
1.5	Stroke (mm):	171.4	171.4	171.4	171.4	171.4	171.4
1.6	Number and layout of cylinders:	6	6	6	6	6	6
1.7	Engine capac. (cm3):	15200	15200	15200	15200	15200	15200
1.8	Rated speed (rpm):	1800	1850	2100	2100	1850	1800
1.9	Max. torque speed (rpm):	1200	1300	1400	1400	1300	1300
1.10	Volumetric compression ratio[1]:	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1
1.11	Combustion system description:	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection
1.12	Drwg of comb. chamber and piston	See attachment	See attachment	See attachment	See attachment	See attachment	See attachment
1.13	Min cross sect. area of inlet and outlet ports:	See attachment	See attachment	See attachment	See attachment	See attachment	See attachment
1.14	**Cooling system**						
1.14.1	**Liquid**						
1.14.1.1	Nature of liquid:	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture
1.14.1.2	Circulating pump(s): yes/no[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.14.1.3	Charac. or make(s) and type(s) (if appl.):	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal
1.14.1.4	Drive ratio(s) (if applicable):	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1
1.14.2	**Air**						
1.14.2.1	Blower: yes/no[2]	No	No	No	No	No	No
1.14.2.2	Charac. or make(s) and type(s) (if appl.):	NA	NA	NA	NA	NA	NA
1.14.2.3	Drive ratio(s) (if applicable):	NA	NA	NA	NA	NA	NA
1.15	**Temp. permitted by the manufac.**						
1.15.1	Liquid cooling: Max. temp. at outlet (K):	377	377	377	377	377	377
1.15.2	Air cooling: Ref. pt.:	NA	NA	NA	NA	NA	NA
	Max. temp. at reference point (K):	NA	NA	NA	NA	NA	NA
1.15.3	Max temp of the inlet intrclr (if app) (K):	323	323	323	323	323	323
1.15.4	Max exhst temp at exit of exhst mnfld. (K):	880	919	906	948	915	930
1.15.5	Fuel temp. (K): min:	NA	NA	NA	NA	NA	NA
	Fuel temp. (K): max:	352	352	352	352	352	352
1.15.6	Lube temp. (K): min:	NA	NA	NA	NA	NA	NA
	Lube temp. (K): max:	383	383	383	383	383	383

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1.	**Descrip. of engine**	980H (17)	D8T (18)	IND (19)	IND (20)	583T (21)	657G (22)
1.16	**Press. charg.: y/n**[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.16.1	Make:	Honeywell	Honeywell	Honeywell	Honeywell	Honeywell	Honeywell
1.16.2	Type:	3827898	3808711	2367659 2514880 3620855	3014296	3808711	3808713
1.16.3	Descrip. of syst. (eg. max press, if appl.):	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal
1.16.4	Intercooler: yes/no[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.17	Maximum inlet restr. (kPa)	3.7	3.7	3.7	3.7	3.7	3.7
1.18	Max exhst backpress. (kPa)	10	10	10	10	10	10
2.	**Measures taken against air pollution**						
2.1	Device for recycling crankcase gases: yes/no	No	No	No	No	No	No
2.2	Add. anti-poll. dev.-Descrip. and/or diag:	NA	NA	NA	NA	NA	NA
2.2.1	**Catalytic converter: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.1.1	Make:	NA	NA	NA	NA	NA	NA
2.2.1.2	Type:	NA	NA	NA	NA	NA	NA
2.2.1.3	Number of catalytic converters and elements	NA	NA	NA	NA	NA	NA
2.2.1.4	Dimensions and volume of the catalytic converter:	NA	NA	NA	NA	NA	NA
2.2.1.5	Type of catalytic action:	NA	NA	NA	NA	NA	NA
2.2.1.6	Total charge of precious metals:	NA	NA	NA	NA	NA	NA
2.2.1.7	Relative concentration:	NA	NA	NA	NA	NA	NA
2.2.1.8	Substrate (structure and material):	NA	NA	NA	NA	NA	NA
2.2.1.9	Cell density:	NA	NA	NA	NA	NA	NA
2.2.1.10	Type of casing for the catalytic converter(s):	NA	NA	NA	NA	NA	NA
2.2.1.11	Location of the catalytic converter(s) (places and max/min distances from engine):	NA	NA	NA	NA	NA	NA
2.2.1.12	Normal operating range (K):	NA	NA	NA	NA	NA	NA
2.2.1.13	Consumable reagent (where appropriate):	NA	NA	NA	NA	NA	NA
2.2.1.13.1	Type and concentration of reagent needed for catalytic action:	NA	NA	NA	NA	NA	NA
2.2.1.13.2	Normal operational temperature range of reagent (K):	NA	NA	NA	NA	NA	NA
2.2.1.13.3	International standard (where appropriate):	NA	NA	NA	NA	NA	NA
2.2.1.14	NOx sensor: yes/no[2]	NA	NA	NA	NA	NA	NA
2.2.2	**Oxygen sensor: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.2.1	Make:	NA	NA	NA	NA	NA	NA
2.2.2.2	Type	NA	NA	NA	NA	NA	NA
2.2.2.3	Location	NA	NA	NA	NA	NA	NA
2.2.3	**Air injection: yes/no**[2]	No	No	No	No	No	No
2.2.3.1	Type (pulse air, air pump, etc.):	NA	NA	NA	NA	NA	NA
2.2.4	**EGR: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.4.1	Characteristics (cooled/uncooled, high pressure/low pressure, etc.):	NA	NA	NA	NA	NA	NA
2.2.5	**Particulate trap: yes/no**	NA	NA	NA	NA	NA	NA
2.2.5.1	Dimensions and capacity of the particulate trap	NA	NA	NA	NA	NA	NA
2.2.5.2	Type and design of the particulate trap	NA	NA	NA	NA	NA	NA
2.2.5.3	Location (places and max/min distance(s) from engine):	NA	NA	NA	NA	NA	NA
2.2.5.4	Method or system of regeneration, description, and/or drawing:	NA	NA	NA	NA	NA	NA
2.2.5.5	Normal operating temperature (K) and pressure (kPa) range:	NA	NA	NA	NA	NA	NA
2.2.6	**Other systems: yes/no**	NA	NA	NA	NA	NA	NA
2.2.6.1	Description and operation:						
3.	**Fuel feed**						
3.1	**Feed pump**						
	Pressure[1] and/or char. diagram (kPa):	550 ± 117	550 ± 117	550 ± 117	550 ± 117	550 ± 117	550 ± 117

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1.	**Descrip. of engine**	980H (17)	D8T (18)	IND (19)	IND (20)	583T (21)	657G (22)
3.2	**Injection system**						
3.2.1	**Pump**						
3.2.1.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.1.2	Type(s):	Part no. 3740750	Part no. 3740750	Part no. 3740750	Part no. 3740750	Part no. 3740750	Part no. 3740750
3.2.1.3	Fuel Delivery:						
a	rated mm3	194	207	239	244	200	280
b	rated rpm	1800	1850	2100	2100	1850	1800
c	pk tq mm3	258	297	314	342	297	322
d	pk tq rpm	1200	1300	1400	1400	1300	1300
e	On eng./on pump bench[2]:	On engine	On engine	On engine	On engine	On engine	On engine
3.2.1.4	**Injection advance**						
3.2.1.4.1	Injec. adv. curve[1]:	Electronic	Electronic	Electronic	Electronic	Electronic	Electronic
3.2.1.4.2	Timing[1]:	Electronic	Electronic	Electronic	Electronic	Electronic	Electronic
3.2.2	**Injection piping**						
3.2.2.1	Length (mm):	NA	NA	NA	NA	NA	NA
3.2.2.2	Internal diam. (mm):	NA	NA	NA	NA	NA	NA
3.2.3	**Injector(s)**						
3.2.3.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.3.2	Type(s):	Part no. 3740750	Part no. 3740750	Part no. 3740750	Part no. 3740750	Part no. 3740750	Part no. 3740750
3.2.3.3	Opening press.[1] or charac. diag. (kPa):	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa
3.2.4	**Governor**						
3.2.4.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.4.2	Type(s):	Electronics group part no. 2268790	Electronics group part no. 2535149	Electronics group part no. 3674105	Electronics group part no. 3290339	Electronics group part no. 2717411	Electronics group part no. 2352804
3.2.4.3	Spd. where cut-off st. und. full ld (rpm)[1]:	1800 ± 10	1850 ± 10	2100 ± 10	2100 ± 10	1850 ± 10	1800 ± 10
3.2.4.4	Maximum no-load speed (rpm)[1]:	2200 ± 10	2070 ± 10	2310 ± 10	2270 ± 10	2200 ± 10	2225 ± 10
3.2.4.5	Idling speed (rpm)[1]:	800	700	700	1000	700	750
3.3	**Cold Start System[3]**						
3.3.1	Make(s):	NA	NA	NA	NA	NA	NA
3.3.2	Type (s):	Ether Aid	Ether Aid	Ether Aid	Ether Aid	Ether Aid	Ether Aid
3.3.3	Description:	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold
4.	**Valve Timing**						
4.1	Max. lift and angl in dead cntrs or eq. data:	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)
4.2	~~Reference and/or~~ setting ranges[2]:	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC

[1] - Specify the tolerance.
[2] - Strike out what does not apply
[3] Cold start aids:

Appendix 2 - ESSENTIAL CHARACTERISTICS OF THE ENGINE FAMILY

1.	**Common parameters:**						
1.1	Combustion cycle:	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke
1.2	Cooling medium:	water	water	water	water	water	water
1.3	Method of air aspir:	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled
1.4	Comb. cham. type/des.	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder
1.5	Valve and porting-config., size, and num.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.
1.6	Fuel system	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection
1.7	Eng. Manag. Systems						
	Prf. of ident. pursuant to dr. #'s:						
1.7.1	Chrg. cooling system:	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM
1.7.2	Exst. gas recirc.[1]	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
1.7.3	Water inj./emul. [1]:	NA	NA	NA	NA	NA	NA
1.7.4	Air injection[1]:	NA	NA	NA	NA	NA	NA
1.8	Exhaust. after-treatment system[1]:	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
	Prf. of ident. ratio:						
2.	**Engine Family Listing**						
2.1	Name of engine family:	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW
2.2	**Spec. of eng. in fam:**						
a	Engine Type	1708	1709	1711	1712	1714	1724
b	No. of cylinders	6	6	6	6	6	6
c	Rated Speed (rpm)	1800	1850	2100	2100	1850	1800
d	Fuel del. per stroke @ rated (mm3)	194	207	239	244	200	280
e	Rated Net Power (kW)	247	259	328	353.5	259	356.5
f	Maximum power speed (min^{-1})	1900	1800	2100	2100	1700	1900
g	Maximum net power (kW)	270	271	328	353.5	270	356.5
h	Max. Torque Speed (rpm)	1200	1300	1400	1400	1300	1300
i	Fuel del. per stroke @ max. torque (mm3)	258	297	314	342	297	322
j	Max. Torque (Nm)	1671	1964	2010	2284	1964	2157
k	Low Idle Speed (rpm)	800	700	700	1000	700	750
l	Cylin. displ. (in % of parent eng.)	100%	100%	100%	100%	100%	100%

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	Engine Family
1.	**General**
1.1	Make (Name of undertaking)
1.2	Type and comm. descrip. of parent and family engines
1.3	Manuf. type coding
1.4	Spec. of mach. to be propelled by engine
1.5	Name and address of Manufacturer
	Nm. and addr. Of manuf. Authorized rep. (if any)
1.6	Loc., coding and method of affixing of the eng. iden. num.
1.7	Loc. and method of affixing of the EC appr. Mark
1.8	Address(es) of assembly plant(s)
	Attachments
1.1	Essential charac-teristics of the parent engine(s)
1.2	Essential charac-teristics of the engine family
1.3	Essential charac-teristics of engine types within the family
2.	Characteristics of engine-related parts of the mobile machinery (if applicable)
3.	Photographs of the parent engine
4.	Any further attach-ments, if any:

Appendix 1 - ESSENTIAL CHARACTERISTICS OF THE (PARENT) ENGINE
Appendix 3 - ESSENTIAL CHARACTERISTICS OF ENGINE TYPE WITHIN THE FAMILY

1.	**Descrip. of engine**	657G (23)	587T (24)	980H (25)	980H (26)	980H (27)	980H (28)
1.1	Manufacturer:	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
1.2	Manufac. engine code:	1725	1735	1736	1739	1740	1741
1.3	Cycle: four stroke / two stroke[2]:	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke
1.4	Bore (mm):	137.2	137.2	137.2	137.2	137.2	137.2
1.5	Stroke (mm):	171.4	171.4	171.4	171.4	171.4	171.4
1.6	Number and layout of cylinders:	6	6	6	6	6	6
1.7	Engine capac. (cm3):	15200	15200	15200	15200	15200	15200
1.8	Rated speed (rpm):	1800	1800	1800	1800	1800	1800
1.9	Max. torque speed (rpm):	1300	1200	1200	1200	1200	1200
1.10	Volumetric compression ratio[1]:	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1
1.11	Combustion system description:	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection
1.12	Drwg of comb. chamber and piston	See attachment	See attachment	See attachment	See attachment	See attachment	See attachment
1.13	Min cross sect. area of inlet and outlet ports:	See attachment	See attachment	See attachment	See attachment	See attachment	See attachment
1.14	**Cooling system**						
1.14.1	**Liquid**						
1.14.1.1	Nature of liquid:	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture
1.14.1.2	Circulating pump(s): yes/no[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.14.1.3	Charac. or make(s) and type(s) (if appl.):	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal
1.14.1.4	Drive ratio(s) (if applicable):	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1
1.14.2	**Air**						
1.14.2.1	Blower: yes/no[2]	No	No	No	No	No	No
1.14.2.2	Charac. or make(s) and type(s) (if appl.):	NA	NA	NA	NA	NA	NA
1.14.2.3	Drive ratio(s) (if applicable):	NA	NA	NA	NA	NA	NA
1.15	**Temp. permitted by the manufac.**						
1.15.1	Liquid cooling: Max. temp. at outlet (K):	377	377	377	377	377	377
1.15.2	Air cooling: Ref. pt.:	NA	NA	NA	NA	NA	NA
	Max. temp. at reference point (K):	NA	NA	NA	NA	NA	NA
1.15.3	Max temp of the inlet intrclr (if app) (K):	323	323	323	323	323	323
1.15.4	Max exhst temp at exit of exhst mnfld. (K):	903	926	914	917	906	907
1.15.5	Fuel temp. (K): min:	NA	NA	NA	NA	NA	NA
	Fuel temp. (K): max:	352	352	352	352	352	352
1.15.6	Lube temp. (K): min:	NA	NA	NA	NA	NA	NA
	Lube temp. (K): max:	383	383	383	383	383	383

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1.	**Descrip. of engine**	657G (23)	587T (24)	980H (25)	980H (26)	980H (27)	980H (28)
1.16	**Press. charg.: y/n**[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.16.1	Make:	Honeywell	Honeywell	Honeywell	Honeywell	Honeywell	Honeywell
1.16.2	Type:	3808713	3808711	3827898	3827897	3827897	3827897
1.16.3	Descrip. of syst. (eg. max press, if appl.):	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal
1.16.4	Intercooler: yes/no[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.17	Maximum inlet restr. (kPa)	3.7	3.7	3.7	3.7	3.7	3.7
1.18	Max exhst backpress. (kPa)	10	10	10	10	10	10
2.	**Measures taken against air pollution**						
2.1	Device for recycling crankcase gases: yes/no	No	No	No	No	No	No
2.2	Add. anti-poll. dev.-Descrip. and/or diag:	NA	NA	NA	NA	NA	NA
2.2.1	**Catalytic converter: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.1.1	Make:	NA	NA	NA	NA	NA	NA
2.2.1.2	Type:	NA	NA	NA	NA	NA	NA
2.2.1.3	Number of catalytic converters and elements	NA	NA	NA	NA	NA	NA
2.2.1.4	Dimensions and volume of the catalytic converter:	NA	NA	NA	NA	NA	NA
2.2.1.5	Type of catalytic action:	NA	NA	NA	NA	NA	NA
2.2.1.6	Total charge of precious metals:	NA	NA	NA	NA	NA	NA
2.2.1.7	Relative concentration:	NA	NA	NA	NA	NA	NA
2.2.1.8	Substrate (structure and material):	NA	NA	NA	NA	NA	NA
2.2.1.9	Cell density:	NA	NA	NA	NA	NA	NA
2.2.1.10	Type of casing for the catalytic converter(s):	NA	NA	NA	NA	NA	NA
2.2.1.11	Location of the catalytic converter(s) (places and max/min distances from engine):	NA	NA	NA	NA	NA	NA
2.2.1.12	Normal operating range (K):	NA	NA	NA	NA	NA	NA
2.2.1.13	Consumable reagent (where appropriate):	NA	NA	NA	NA	NA	NA
2.2.1.13.1	Type and concentration of reagent needed for catalytic action:	NA	NA	NA	NA	NA	NA
2.2.1.13.2	Normal operational temperature range of reagent (K):	NA	NA	NA	NA	NA	NA
2.2.1.13.3	International standard (where appropriate):	NA	NA	NA	NA	NA	NA
2.2.1.14	NOx sensor: yes/no[2]	NA	NA	NA	NA	NA	NA
2.2.2	**Oxygen sensor: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.2.1	Make:	NA	NA	NA	NA	NA	NA
2.2.2.2	Type	NA	NA	NA	NA	NA	NA
2.2.2.3	Location	NA	NA	NA	NA	NA	NA
2.2.3	**Air injection: yes/no**[2]	No	No	No	No	No	No
2.2.3.1	Type (pulse air, air pump, etc.):	NA	NA	NA	NA	NA	NA
2.2.4	**EGR: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.4.1	Characteristics (cooled/uncooled, high pressure/low pressure, etc.):	NA	NA	NA	NA	NA	NA
2.2.5	**Particulate trap: yes/no**	NA	NA	NA	NA	NA	NA
2.2.5.1	Dimensions and capacity of the particulate trap	NA	NA	NA	NA	NA	NA
2.2.5.2	Type and design of the particulate trap	NA	NA	NA	NA	NA	NA
2.2.5.3	Location (places and max/min distance(s) from engine):	NA	NA	NA	NA	NA	NA
2.2.5.4	Method or system of regeneration, description, and/or drawing:	NA	NA	NA	NA	NA	NA
2.2.5.5	Normal operating temperature (K) and pressure (kPa) range:	NA	NA	NA	NA	NA	NA
2.2.6	**Other systems: yes/no**	NA	NA	NA	NA	NA	NA
2.2.6.1	Description and operation:						
3.	**Fuel feed**						
3.1	**Feed pump**						
	Pressure[1] and/or char. diagram (kPa):	550 ± 117	550 ± 117	550 ± 117	550 ± 117	550 ± 117	550 ± 117

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1.	**Descrip. of engine**	657G (23)	587T (24)	980H (25)	980H (26)	980H (27)	980H (28)
3.2	**Injection system**						
3.2.1	**Pump**						
3.2.1.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.1.2	Type(s):	Part no. 3740750	Part no. 3740750	Part no. 3740750	Part no. 3740750	Part no. 3740750	Part no. 3740750
3.2.1.3	Fuel Delivery:						
a	rated mm3	258	231	207	233	213	214
b	rated rpm	1800	1800	1800	1800	1800	1800
c	pk tq mm3	295	308	266	272	265	267
d	pk tq rpm	1300	1200	1200	1200	1200	1200
e	On eng./on pump bench[2]:	On engine	On engine	On engine	On engine	On engine	On engine
3.2.1.4	**Injection advance**						
3.2.1.4.1	Injec. adv. curve[1]:	Electronic	Electronic	Electronic	Electronic	Electronic	Electronic
3.2.1.4.2	Timing[1]:	Electronic	Electronic	Electronic	Electronic	Electronic	Electronic
3.2.2	**Injection piping**						
3.2.2.1	Length (mm):	NA	NA	NA	NA	NA	NA
3.2.2.2	Internal diam. (mm):	NA	NA	NA	NA	NA	NA
3.2.3	**Injector(s)**						
3.2.3.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.3.2	Type(s):	Part no. 3740750	Part no. 3740750	Part no. 3740750	Part no. 3740750	Part no. 3740750	Part no. 3740750
3.2.3.3	Opening press.[1] or charac. diag. (kPa):	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa
3.2.4	**Governor**						
3.2.4.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.4.2	Type(s):	Electronics group part no. 2352804	Electronics group part no. 2628066	Electronics group part no. 2822075	Electronics group part no. 2844294	Electronics group part no. 2844294	Electronics group part no. 2844294
3.2.4.3	Spd. where cut-off st. und. full ld (rpm)[1]:	1800 ± 10	1800 ± 10	1800 ± 10	1800 ± 10	1800 ± 10	1800 ± 10
3.2.4.4	Maximum no-load speed (rpm)[1]:	2225 ± 10	2200 ± 10	2200 ± 10	2200 ± 10	2200 ± 10	2200 ± 10
3.2.4.5	Idling speed (rpm)[1]:	750	700	800	800	800	800
3.3	**Cold Start System[3]**						
3.3.1	Make(s):	NA	NA	NA	NA	NA	NA
3.3.2	Type (s):	Ether Aid	Ether Aid	Ether Aid	Ether Aid	Ether Aid	Ether Aid
3.3.3	Description:	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold
4.	**Valve Timing**						
4.1	Max. lift and angl in dead cntrs or eq. data:	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)
4.2	~~Reference and/or~~ setting ranges[2]:	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC

[1] - Specify the tolerance.
[2] - Strike out what does not apply
[3] Cold start aids:

Appendix 2 - ESSENTIAL CHARACTERISTICS OF THE ENGINE FAMILY

1.	**Common parameters:**						
1.1	Combustion cycle:	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke
1.2	Cooling medium:	water	water	water	water	water	water
1.3	Method of air aspir:	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled
1.4	Comb. cham. type/des.	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder
1.5	Valve and porting-config., size, and num.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.
1.6	Fuel system	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection
1.7	Eng. Manag. Systems						
	Prf. of ident. pursuant to dr. #'s:						
1.7.1	Chrg. cooling system:	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM
1.7.2	Exst. gas recirc.[1]	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
1.7.3	Water inj./emul.[1]:	NA	NA	NA	NA	NA	NA
1.7.4	Air injection[1]:	NA	NA	NA	NA	NA	NA
1.8	Exhaust. after-treatment system[1]:	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
	Prf. of ident. ratio:						
2.	**Engine Family Listing**						
2.1	Name of engine family:	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW
2.2	**Spec. of eng. in fam:**						
a	Engine Type	1725	1735	1736	1739	1740	1741
b	No. of cylinders	6	6	6	6	6	6
c	Rated Speed (rpm)	1800	1800	1800	1800	1800	1800
d	Fuel del. per stroke @ rated (mm3)	258	231	207	233	213	214
e	Rated Net Power (kW)	326	294	264	293	270	270
f	Maximum power speed (min^{-1})	1900	1700	1800	1900	1900	1900
g	Maximum net power (kW)	356	294	264	293	270	270
h	Max. Torque Speed (rpm)	1300	1200	1200	1200	1200	1200
i	Fuel del. per stroke @ max. torque (mm3)	295	308	266	272	265	267
j	Max. Torque (Nm)	1968	2031	1742	1803	1738	1740
k	Low Idle Speed (rpm)	750	700	800	800	800	800
l	Cylin. displ. (in % of parent eng.)	100%	100%	100%	100%	100%	100%

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	Engine Family
1.	**General**
1.1	Make (Name of undertaking)
1.2	Type and comm. descrip. of parent and family engines
1.3	Manuf. type coding
1.4	Spec. of mach. to be propelled by engine
1.5	Name and address of Manufacturer
	Nm. and addr. Of manuf. Authorized rep. (if any)
1.6	Loc., coding and method of affixing of the eng. iden. num.
1.7	Loc. and method of affixing of the EC appr. Mark
1.8	Address(es) of assembly plant(s)
	Attachments
1.1	Essential charac-teristics of the parent engine(s)
1.2	Essential charac-teristics of the engine family
1.3	Essential charac-teristics of engine types within the family
2.	Characteristics of engine-related parts of the mobile machinery (if applicable)
3.	Photographs of the parent engine
4.	Any further attach-ments, if any:

Appendix 1 - ESSENTIAL CHARACTERISTICS OF THE (PARENT) ENGINE
Appendix 3 - ESSENTIAL CHARACTERISTICS OF ENGINE TYPE WITHIN THE FAMILY

1.	**Descrip. of engine**	980H (29)	IND (30)	IND (31)	365D (32)	365D (33)	980H (34)
1.1	Manufacturer:	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
1.2	Manufac. engine code:	1742	1743	1745	10869	1748	10849
1.3	Cycle: four stroke / two stroke[2]:	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke
1.4	Bore (mm):	137.2	137.2	137.2	137.2	137.2	137.2
1.5	Stroke (mm):	171.4	171.4	171.4	171.4	171.4	171.4
1.6	Number and layout of cylinders:	6	6	6	6	6	6
1.7	Engine capac. (cm3):	15200	15200	15200	15200	15200	15200
1.8	Rated speed (rpm):	1800	2100	2100	1800	1800	1800
1.9	Max. torque speed (rpm):	1200	1400	1400	1350	1400	1200
1.10	Volumetric compression ratio[1]:	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1
1.11	Combustion system description:	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection
1.12	Drwg of comb. chamber and piston	See attachment	See attachment	See attachment	See attachment	See attachment	See attachment
1.13	Min cross sect. area of inlet and outlet ports:	See attachment	See attachment	See attachment	See attachment	See attachment	See attachment
1.14	**Cooling system**						
1.14.1	**Liquid**						
1.14.1.1	Nature of liquid:	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture
1.14.1.2	Circulating pump(s): yes/no[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.14.1.3	Charac. or make(s) and type(s) (if appl.):	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal
1.14.1.4	Drive ratio(s) (if applicable):	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1
1.14.2	**Air**						
1.14.2.1	Blower: yes/no[2]	No	No	No	No	No	No
1.14.2.2	Charac. or make(s) and type(s) (if appl.):	NA	NA	NA	NA	NA	NA
1.14.2.3	Drive ratio(s) (if applicable):	NA	NA	NA	NA	NA	NA
1.15	**Temp. permitted by the manufac.**						
1.15.1	Liquid cooling: Max. temp. at outlet (K):	377	377	377	377	377	377
1.15.2	Air cooling: Ref. pt.:	NA	NA	NA	NA	NA	NA
	Max. temp. at reference point (K):	NA	NA	NA	NA	NA	NA
1.15.3	Max temp of the inlet intrclr (if app) (K):	323	323	323	323	323	323
1.15.4	Max exhst temp at exit of exhst mnfld. (K):	903	946	936	966	940	970
1.15.5	Fuel temp. (K): min:	NA	NA	NA	NA	NA	NA
	Fuel temp. (K): max:	352	352	352	352	352	352
1.15.6	Lube temp. (K): min:	NA	NA	NA	NA	NA	NA
	Lube temp. (K): max:	383	383	383	383	383	383

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1.	**Descrip. of engine**	980H (29)	IND (30)	IND (31)	365D (32)	365D (33)	980H (34)
1.16	**Press. charg.: y/n**[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.16.1	Make:	Honeywell	Honeywell	Honeywell	Honeywell	Honeywell	Honeywell
1.16.2	Type:	3827897	3014296	3014296	3808712	3808712	3827901 3827897
1.16.3	Descrip. of syst. (eg. max press, if appl.):	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal
1.16.4	Intercooler: yes/no[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.17	Maximum inlet restr. (kPa)	3.7	3.7	3.7	3.7	3.7	3.7
1.18	Max exhst backpress. (kPa)	10	10	10	10	10	10
2.	**Measures taken against air pollution**						
2.1	Device for recycling crankcase gases: yes/no	No	No	No	No	No	No
2.2	Add. anti-poll. dev.-Descrip. and/or diag:	NA	NA	NA	NA	NA	NA
2.2.1	**Catalytic converter: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.1.1	Make:	NA	NA	NA	NA	NA	NA
2.2.1.2	Type:	NA	NA	NA	NA	NA	NA
2.2.1.3	Number of catalytic converters and elements	NA	NA	NA	NA	NA	NA
2.2.1.4	Dimensions and volume of the catalytic converter:	NA	NA	NA	NA	NA	NA
2.2.1.5	Type of catalytic action:	NA	NA	NA	NA	NA	NA
2.2.1.6	Total charge of precious metals:	NA	NA	NA	NA	NA	NA
2.2.1.7	Relative concentration:	NA	NA	NA	NA	NA	NA
2.2.1.8	Substrate (structure and material):	NA	NA	NA	NA	NA	NA
2.2.1.9	Cell density:	NA	NA	NA	NA	NA	NA
2.2.1.10	Type of casing for the catalytic converter(s):	NA	NA	NA	NA	NA	NA
2.2.1.11	Location of the catalytic converter(s) (places and max/min distances from engine):	NA	NA	NA	NA	NA	NA
2.2.1.12	Normal operating range (K):	NA	NA	NA	NA	NA	NA
2.2.1.13	Consumable reagent (where appropriate):	NA	NA	NA	NA	NA	NA
2.2.1.13.1	Type and concentration of reagent needed for catalytic action:	NA	NA	NA	NA	NA	NA
2.2.1.13.2	Normal operational temperature range of reagent (K):	NA	NA	NA	NA	NA	NA
2.2.1.13.3	International standard (where appropriate):	NA	NA	NA	NA	NA	NA
2.2.1.14	NOx sensor: yes/no[2]	NA	NA	NA	NA	NA	NA
2.2.2	**Oxygen sensor: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.2.1	Make:	NA	NA	NA	NA	NA	NA
2.2.2.2	Type	NA	NA	NA	NA	NA	NA
2.2.2.3	Location	NA	NA	NA	NA	NA	NA
2.2.3	**Air injection: yes/no**[2]	No	No	No	No	No	No
2.2.3.1	Type (pulse air, air pump, etc.):	NA	NA	NA	NA	NA	NA
2.2.4	**EGR: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.4.1	Characteristics (cooled/uncooled, high pressure/low pressure, etc.):	NA	NA	NA	NA	NA	NA
2.2.5	**Particulate trap: yes/no**	NA	NA	NA	NA	NA	NA
2.2.5.1	Dimensions and capacity of the particulate trap	NA	NA	NA	NA	NA	NA
2.2.5.2	Type and design of the particulate trap	NA	NA	NA	NA	NA	NA
2.2.5.3	Location (places and max/min distance(s) from engine):	NA	NA	NA	NA	NA	NA
2.2.5.4	Method or system of regeneration, description, and/or drawing:	NA	NA	NA	NA	NA	NA
2.2.5.5	Normal operating temperature (K) and pressure (kPa) range:	NA	NA	NA	NA	NA	NA
2.2.6	**Other systems: yes/no**	NA	NA	NA	NA	NA	NA
2.2.6.1	Description and operation:						
3.	**Fuel feed**						
3.1	**Feed pump**						
	Pressure[1] and/or char. diagram (kPa):	550 ± 117	550 ± 117	550 ± 117	550 ± 117	550 ± 117	550 ± 117

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1.	**Descrip. of engine**	980H (29)	IND (30)	IND (31)	365D (32)	365D (33)	980H (34)
3.2	**Injection system**						
3.2.1	**Pump**						
3.2.1.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.1.2	Type(s):	Part no. 3740750	Part no. 2800574	Part no. 2800574	Part no. 3740750	Part no. 3740750	Part no. 3740750
3.2.1.3	Fuel Delivery:						
a	rated mm3	201	230	213	297	249	251
b	rated rpm	1800	2100	2100	1800	1800	1800
c	pk tq mm3	258	317	300	338	312	282
d	pk tq rpm	1200	1400	1400	1350	1400	1200
e	On eng./on pump bench[2]:	On engine	On engine	On engine	On engine	On engine	On engine
3.2.1.4	**Injection advance**						
3.2.1.4.1	Injec. adv. curve[1]:	Electronic	Electronic	Electronic	Electronic	Electronic	Electronic
3.2.1.4.2	Timing[1]:	Electronic	Electronic	Electronic	Electronic	Electronic	Electronic
3.2.2	**Injection piping**						
3.2.2.1	Length (mm):	NA	NA	NA	NA	NA	NA
3.2.2.2	Internal diam. (mm):	NA	NA	NA	NA	NA	NA
3.2.3	**Injector(s)**						
3.2.3.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.3.2	Type(s):	Part no. 3740750	Part no. 2800574	Part no. 2800574	Part no. 3740750	Part no. 3740750	Part no. 3740750
3.2.3.3	Opening press.[1] or charac. diag. (kPa):	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa
3.2.4	**Governor**						
3.2.4.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.4.2	Type(s):	Electronics group part no. 2844294	Electronics group part no. 3290337	Electronics group part no. 3290335	Electronics group part no. 2922234	Electronics group part no. 2922234	Electronics group part no. 3206137
3.2.4.3	Spd. where cut-off st. und. full ld (rpm)[1]:	1800 ± 10	2100 ± 10	2100 ± 10	1800 ± 10	1800 ± 10	1800 ± 10
3.2.4.4	Maximum no-load speed (rpm)[1]:	2200 ± 10	2310 ± 10	2270 ± 10	1980 ± 10	1980 ± 10	2200 ± 10
3.2.4.5	Idling speed (rpm)[1]:	800	1000	1000	900	900	800
3.3	**Cold Start System[3]**						
3.3.1	Make(s):	NA	NA	NA	NA	NA	NA
3.3.2	Type (s):	Ether Aid	Ether Aid	Ether Aid	Ether Aid	Ether Aid	Ether Aid
3.3.3	Description:	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold
4.	**Valve Timing**						
4.1	Max. lift and angl in dead cntrs or eq. data:	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)
4.2	~~Reference and/or~~ setting ranges[2]:	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC

[1] - Specify the tolerance.
[2] - Strike out what does not apply
[3] Cold start aids:

Appendix 2 - ESSENTIAL CHARACTERISTICS OF THE ENGINE FAMILY

1.	**Common parameters:**						
1.1	Combustion cycle:	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke
1.2	Cooling medium:	water	water	water	water	water	water
1.3	Method of air aspir:	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled
1.4	Comb. cham. type/des.	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder
1.5	Valve and porting-config., size, and num.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.
1.6	Fuel system	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection
1.7	Eng. Manag. Systems						
	Prf. of ident. pursuant to dr. #'s:						
1.7.1	Chrg. cooling system:	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM
1.7.2	Exst. gas recirc.[1]	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
1.7.3	Water inj./emul. [1]:	NA	NA	NA	NA	NA	NA
1.7.4	Air injection[1]:	NA	NA	NA	NA	NA	NA
1.8	Exhaust. after-treatment system[1]:	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
	Prf. of ident. ratio:						
2.	**Engine Family Listing**						
2.1	Name of engine family:	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW
2.2	**Spec. of eng. in fam:**						
a	Engine Type	1742	1743	1745	10869	1748	10849
b	No. of cylinders	6	6	6	6	6	6
c	Rated Speed (rpm)	1800	2100	2100	1800	1800	1800
d	Fuel del. per stroke @ rated (mm3)	201	230	213	297	249	251
e	Rated Net Power (kW)	248	330	307	382	323	293
f	Maximum power speed (min^{-1})	1800	2100	1900	1800	1800	1800
g	Maximum net power (kW)	248	330	332	382	323	297
h	Max. Torque Speed (rpm)	1200	1400	1400	1350	1400	1200
i	Fuel del. per stroke @ max. torque (mm3)	258	317	300	338	312	282
j	Max. Torque (Nm)	1675	2134	1986	2211	2056	1803
k	Low Idle Speed (rpm)	800	1000	1000	900	900	800
l	Cylin. displ. (in % of parent eng.)	100%	100%	100%	100%	100%	100%

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	Engine Family
1.	**General**
1.1	Make (Name of undertaking)
1.2	Type and comm. descrip. of parent and family engines
1.3	Manuf. type coding
1.4	Spec. of mach. to be propelled by engine
1.5	Name and address of Manufacturer
	Nm. and addr. Of manuf. Authorized rep. (if any)
1.6	Loc., coding and method of affixing of the eng. iden. num.
1.7	Loc. and method of affixing of the EC appr. Mark
1.8	Address(es) of assembly plant(s)
	Attachments
1.1	Essential charac-teristics of the parent engine(s)
1.2	Essential charac-teristics of the engine family
1.3	Essential charac-teristics of engine types within the family
2.	Characteristics of engine-related parts of the mobile machinery (if applicable)
3.	Photographs of the parent engine
4.	Any further attach-ments, if any:

Appendix 1 - ESSENTIAL CHARACTERISTICS OF THE (PARENT) ENGINE
Appendix 3 - ESSENTIAL CHARACTERISTICS OF ENGINE TYPE WITHIN THE FAMILY

1.	**Descrip. of engine**	980H (35)	980H (36)	980H (37)	740 (38)	740 (39)	770 (40)
1.1	Manufacturer:	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
1.2	Manufac. engine code:	10850	11097	11098	11095	11094	11382
1.3	Cycle: four stroke / two stroke[2]:	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke
1.4	Bore (mm):	137.2	137.2	137.2	137.2	137.2	137.2
1.5	Stroke (mm):	171.4	171.4	171.4	171.4	171.4	171.4
1.6	Number and layout of cylinders:	6	6	6	6	6	6
1.7	Engine capac. (cm3):	15200	15200	15200	15200	15200	15200
1.8	Rated speed (rpm):	1800	1800	1800	1800	1700	1800
1.9	Max. torque speed (rpm):	1200	1200	1200	1200	1200	1300
1.10	Volumetric compression ratio[1]:	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1
1.11	Combustion system description:	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection
1.12	Drwg of comb. chamber and piston	See attachment	See attachment	See attachment	See attachment	See attachment	See attachment
1.13	Min cross sect. area of inlet and outlet ports:	See attachment	See attachment	See attachment	See attachment	See attachment	See attachment
1.14	**Cooling system**						
1.14.1	**Liquid**						
1.14.1.1	Nature of liquid:	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture
1.14.1.2	Circulating pump(s): yes/no[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.14.1.3	Charac. or make(s) and type(s) (if appl.):	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal
1.14.1.4	Drive ratio(s) (if applicable):	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1
1.14.2	**Air**						
1.14.2.1	Blower: yes/no[2]	No	No	No	No	No	No
1.14.2.2	Charac. or make(s) and type(s) (if appl.):	NA	NA	NA	NA	NA	NA
1.14.2.3	Drive ratio(s) (if applicable):	NA	NA	NA	NA	NA	NA
1.15	**Temp. permitted by the manufac.**						
1.15.1	Liquid cooling: Max. temp. at outlet (K):	377	377	377	377	377	377
1.15.2	Air cooling: Ref. pt.:	NA	NA	NA	NA	NA	NA
	Max. temp. at reference point (K):	NA	NA	NA	NA	NA	NA
1.15.3	Max temp of the inlet intrclr (if app) (K):	323	323	323	323	323	323
1.15.4	Max exhst temp at exit of exhst mnfld. (K):	956	956	947	989	992	971.5
1.15.5	Fuel temp. (K): min:	NA	NA	NA	NA	NA	NA
	Fuel temp. (K): max:	352	352	352	352	352	352
1.15.6	Lube temp. (K): min:	NA	NA	NA	NA	NA	NA
	Lube temp. (K): max:	383	383	383	383	383	383

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1.	**Descrip. of engine**	980H (35)	980H (36)	980H (37)	740 (38)	740 (39)	770 (40)
1.16	**Press. charg.: y/n**[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.16.1	Make:	Honeywell	Honeywell	Honeywell	Honeywell	Honeywell	Honeywell
1.16.2	Type:	3827901 3827897	3827901 3827897	3827901 3827897	3620856	3620856	3808699
1.16.3	Descrip. of syst. (eg. max press, if appl.):	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal
1.16.4	Intercooler: yes/no[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.17	Maximum inlet restr. (kPa)	3.7	3.7	3.7	3.7	3.7	3.7
1.18	Max exhst backpress. (kPa)	10	10	10	10	10	10
2.	**Measures taken against air pollution**						
2.1	Device for recycling crankcase gases: yes/no	No	No	No	No	No	No
2.2	Add. anti-poll. dev.-Descrip. and/or diag:	NA	NA	NA	NA	NA	NA
2.2.1	**Catalytic converter: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.1.1	Make:	NA	NA	NA	NA	NA	NA
2.2.1.2	Type:	NA	NA	NA	NA	NA	NA
2.2.1.3	Number of catalytic converters and elements	NA	NA	NA	NA	NA	NA
2.2.1.4	Dimensions and volume of the catalytic converter:	NA	NA	NA	NA	NA	NA
2.2.1.5	Type of catalytic action:	NA	NA	NA	NA	NA	NA
2.2.1.6	Total charge of precious metals:	NA	NA	NA	NA	NA	NA
2.2.1.7	Relative concentration:	NA	NA	NA	NA	NA	NA
2.2.1.8	Substrate (structure and material):	NA	NA	NA	NA	NA	NA
2.2.1.9	Cell density:	NA	NA	NA	NA	NA	NA
2.2.1.10	Type of casing for the catalytic converter(s):	NA	NA	NA	NA	NA	NA
2.2.1.11	Location of the catalytic converter(s) (places and max/min distances from engine):	NA	NA	NA	NA	NA	NA
2.2.1.12	Normal operating range (K):	NA	NA	NA	NA	NA	NA
2.2.1.13	Consumable reagent (where appropriate):	NA	NA	NA	NA	NA	NA
2.2.1.13.1	Type and concentration of reagent needed for catalytic action:	NA	NA	NA	NA	NA	NA
2.2.1.13.2	Normal operational temperature range of reagent (K):	NA	NA	NA	NA	NA	NA
2.2.1.13.3	International standard (where appropriate):	NA	NA	NA	NA	NA	NA
2.2.1.14	NOx sensor: yes/no[2]	NA	NA	NA	NA	NA	NA
2.2.2	**Oxygen sensor: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.2.1	Make:	NA	NA	NA	NA	NA	NA
2.2.2.2	Type	NA	NA	NA	NA	NA	NA
2.2.2.3	Location	NA	NA	NA	NA	NA	NA
2.2.3	**Air injection: yes/no**[2]	No	No	No	No	No	No
2.2.3.1	Type (pulse air, air pump, etc.):	NA	NA	NA	NA	NA	NA
2.2.4	**EGR: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.4.1	Characteristics (cooled/uncooled, high pressure/low pressure, etc.):	NA	NA	NA	NA	NA	NA
2.2.5	**Particulate trap: yes/no**	NA	NA	NA	NA	NA	NA
2.2.5.1	Dimensions and capacity of the particulate trap	NA	NA	NA	NA	NA	NA
2.2.5.2	Type and design of the particulate trap	NA	NA	NA	NA	NA	NA
2.2.5.3	Location (places and max/min distance(s) from engine):	NA	NA	NA	NA	NA	NA
2.2.5.4	Method or system of regeneration, description, and/or drawing:	NA	NA	NA	NA	NA	NA
2.2.5.5	Normal operating temperature (K) and pressure (kPa) range:	NA	NA	NA	NA	NA	NA
2.2.6	**Other systems: yes/no**	NA	NA	NA	NA	NA	NA
2.2.6.1	Description and operation:						
3.	**Fuel feed**						
3.1	**Feed pump**						
	Pressure[1] and/or char. diagram (kPa):	550 ± 117	550 ± 117	550 ± 117	550 ± 117	550 ± 117	550 ± 117

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1.	**Descrip. of engine**	980H (35)	980H (36)	980H (37)	740 (38)	740 (39)	770 (40)
3.2	**Injection system**						
3.2.1	**Pump**						
3.2.1.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.1.2	Type(s):	Part no. 3740750	Part no. 3740750	Part no. 3740750	Part no. 3740750	Part no. 3740750	Part no. 3740750
3.2.1.3	Fuel Delivery:						
a	rated mm3	233	233	217	269	281	295
b	rated rpm	1800	1800	1800	1800	1700	1800
c	pk tq mm3	272	272	262	356	360	345
d	pk tq rpm	1200	1200	1200	1200	1200	1300
e	On eng./on pump bench[2]:	On engine	On engine	On engine	On engine	On engine	On engine
3.2.1.4	**Injection advance**						
3.2.1.4.1	Injec. adv. curve[1]:	Electronic	Electronic	Electronic	Electronic	Electronic	Electronic
3.2.1.4.2	Timing[1]:	Electronic	Electronic	Electronic	Electronic	Electronic	Electronic
3.2.2	**Injection piping**						
3.2.2.1	Length (mm):	NA	NA	NA	NA	NA	NA
3.2.2.2	Internal diam. (mm):	NA	NA	NA	NA	NA	NA
3.2.3	**Injector(s)**						
3.2.3.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.3.2	Type(s):	Part no. 3740750	Part no. 3740750	Part no. 3740750	Part no. 3740750	Part no. 3740750	Part no. 3740750
3.2.3.3	Opening press.[1] or charac. diag. (kPa):	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa
3.2.4	**Governor**						
3.2.4.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.4.2	Type(s):	Electronics group part no. 3206137	Electronics group part no. 3206137	Electronics group part no. 3206137	Electronics group part no. 3209656	Electronics group part no. 3209656	Electronics group part no. 3309714
3.2.4.3	Spd. where cut-off st. und. full ld (rpm)[1]:	1800 ± 10	1800 ± 10	1800 ± 10	1800 ± 10	1700 ± 10	1800 ± 10
3.2.4.4	Maximum no-load speed (rpm)[1]:	2200 ± 10	2200 ± 10	2200 ± 10	2105 ± 10	2105 ± 10	2200 ± 10
3.2.4.5	Idling speed (rpm)[1]:	800	800	800	700	700	650
3.3	**Cold Start System[3]**						
3.3.1	Make(s):	NA	NA	NA	NA	NA	NA
3.3.2	Type (s):	Ether Aid	Ether Aid	Ether Aid	Ether Aid	Ether Aid	Ether Aid
3.3.3	Description:	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold
4.	**Valve Timing**						
4.1	Max. lift and angl in dead cntrs or eq. data:	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)
4.2	~~Reference and/or~~ setting ranges[2]:	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC

[1] - Specify the tolerance.
[2] - Strike out what does not apply
[3] Cold start aids:

Appendix 2 - ESSENTIAL CHARACTERISTICS OF THE ENGINE FAMILY

1.	**Common parameters:**						
1.1	Combustion cycle:	4 stroke water	4 stroke water	4 stroke water	4 stroke water	4 stroke water	4 stroke water
1.2	Cooling medium:						
1.3	Method of air aspir:	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled
1.4	Comb. cham. type/des.	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder
1.5	Valve and porting-config., size, and num.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.
1.6	Fuel system	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection
1.7	Eng. Manag. Systems						
	Prf. of ident. pursuant to dr. #'s:						
1.7.1	Chrg. cooling system:	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM
1.7.2	Exst. gas recirc.[1]	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
1.7.3	Water inj./emul.[1]:	NA	NA	NA	NA	NA	NA
1.7.4	Air injection[1]:	NA	NA	NA	NA	NA	NA
1.8	Exhaust. after-treatment system[1]:	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
	Prf. of ident. ratio:						
2.	**Engine Family Listing**						
2.1	Name of engine family:	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW
2.2	**Spec. of eng. in fam:**						
a	Engine Type	10850	11097	11098	11095	11094	11382
b	No. of cylinders	6	6	6	6	6	6
c	Rated Speed (rpm)	1800	1800	1800	1800	1700	1800
d	Fuel del. per stroke @ rated (mm3)	233	233	217	269	281	295
e	Rated Net Power (kW)	270	270	248	350	341	381
f	Maximum power speed (min^{-1})	1800	1800	1800	1800	1700	1800
g	Maximum net power (kW)	270	270	248	350	341	381
h	Max. Torque Speed (rpm)	1200	1200	1200	1200	1200	1300
i	Fuel del. per stroke @ max. torque (mm3)	272	272	262	356	360	345
j	Max. Torque (Nm)	1738	1738	1675	2412	2412	2320
k	Low Idle Speed (rpm)	800	800	800	700	700	650
l	Cylin. displ. (in % of parent eng.)	100%	100%	100%	100%	100%	100%

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	Engine Family
1.	**General**
1.1	Make (Name of undertaking)
1.2	Type and comm. descrip. of parent and family engines
1.3	Manuf. type coding
1.4	Spec. of mach. to be propelled by engine
1.5	Name and address of Manufacturer
	Nm. and addr. Of manuf. Authorized rep. (if any)
1.6	Loc., coding and method of affixing of the eng. iden. num.
1.7	Loc. and method of affixing of the EC appr. Mark
1.8	Address(es) of assembly plant(s)
	Attachments
1.1	Essential charac-teristics of the parent engine(s)
1.2	Essential charac-teristics of the engine family
1.3	Essential charac-teristics of engine types within the family
2.	Characteristics of engine-related parts of the mobile machinery (if applicable)
3.	Photographs of the parent engine
4.	Any further attach-ments, if any:

Appendix 1 - ESSENTIAL CHARACTERISTICS OF THE (PARENT) ENGINE
Appendix 3 - ESSENTIAL CHARACTERISTICS OF ENGINE TYPE WITHIN THE FAMILY

1.	**Descrip. of engine**	770 (41)	735 (42)	IND (43)	PL83 (44)	PL87 (45)	R2900 (46)
1.1	Manufacturer:	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
1.2	Manufac. engine code:	11383	11430	11674	11901	11902	1733
1.3	Cycle: four stroke / two stroke[2]:	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke
1.4	Bore (mm):	137.2	137.2	137.2	137.2	137.2	137.2
1.5	Stroke (mm):	171.4	171.4	171.4	171.4	171.4	171.4
1.6	Number and layout of cylinders:	6	6	6	6	6	6
1.7	Engine capac. (cm3):	15200	15200	15200	15200	15200	15200
1.8	Rated speed (rpm):	1800	1800	2100	1850	1800	1900
1.9	Max. torque speed (rpm):	1300	1350	1400	1300	1200	1425
1.10	Volumetric compression ratio[1]:	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1
1.11	Combustion system description:	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection
1.12	Drwg of comb. chamber and piston	See attachment	See attachment	See attachment	See attachment	See attachment	See attachment
1.13	Min cross sect. area of inlet and outlet ports:	See attachment	See attachment	See attachment	See attachment	See attachment	See attachment
1.14	**Cooling system**						
1.14.1	**Liquid**						
1.14.1.1	Nature of liquid:	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture
1.14.1.2	Circulating pump(s): yes/no[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.14.1.3	Charac. or make(s) and type(s) (if appl.):	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal
1.14.1.4	Drive ratio(s) (if applicable):	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1
1.14.2	**Air**						
1.14.2.1	Blower: yes/no[2]	No	No	No	No	No	No
1.14.2.2	Charac. or make(s) and type(s) (if appl.):	NA	NA	NA	NA	NA	NA
1.14.2.3	Drive ratio(s) (if applicable):	NA	NA	NA	NA	NA	NA
1.15	**Temp. permitted by the manufac.**						
1.15.1	Liquid cooling: Max. temp. at outlet (K):	377	377	377	377	377	377
1.15.2	Air cooling: Ref. pt.:	NA	NA	NA	NA	NA	NA
	Max. temp. at reference point (K):	NA	NA	NA	NA	NA	NA
1.15.3	Max temp of the inlet intrclr (if app) (K):	323	323	323	323	323	323
1.15.4	Max exhst temp at exit of exhst mnfld. (K):	934	962	993	914	926	930
1.15.5	Fuel temp. (K): min:	NA	NA	NA	NA	NA	NA
	Fuel temp. (K): max:	352	352	352	352	352	352
1.15.6	Lube temp. (K): min:	NA	NA	NA	NA	NA	NA
	Lube temp. (K): max:	383	383	383	383	383	383

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1.	**Descrip. of engine**	770 (41)	735 (42)	IND (43)	PL83 (44)	PL87 (45)	R2900 (46)
1.16	**Press. charg.: y/n**[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.16.1	Make:	Honeywell	Honeywell	Honeywell	Honeywell	Honeywell	Honeywell
1.16.2	Type:	3808699	3620856	2400003 2520804 3619712 3620846	3808711	3808711	3963874
1.16.3	Descrip. of syst. (eg. max press, if appl.):	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal
1.16.4	Intercooler: yes/no[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.17	Maximum inlet restr. (kPa)	3.7	3.7	3.7	3.7	3.7	3.7
1.18	Max exhst backpress. (kPa)	10	10	10	10	10	10
2.	**Measures taken against air pollution**						
2.1	Device for recycling crankcase gases: yes/no	No	No	No	No	No	No
2.2	Add. anti-poll. dev.-Descrip. and/or diag:	NA	NA	NA	NA	NA	NA
2.2.1	**Catalytic converter: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.1.1	Make:	NA	NA	NA	NA	NA	NA
2.2.1.2	Type:	NA	NA	NA	NA	NA	NA
2.2.1.3	Number of catalytic converters and elements	NA	NA	NA	NA	NA	NA
2.2.1.4	Dimensions and volume of the catalytic converter:	NA	NA	NA	NA	NA	NA
2.2.1.5	Type of catalytic action:	NA	NA	NA	NA	NA	NA
2.2.1.6	Total charge of precious metals:	NA	NA	NA	NA	NA	NA
2.2.1.7	Relative concentration:	NA	NA	NA	NA	NA	NA
2.2.1.8	Substrate (structure and material):	NA	NA	NA	NA	NA	NA
2.2.1.9	Cell density:	NA	NA	NA	NA	NA	NA
2.2.1.10	Type of casing for the catalytic converter(s):	NA	NA	NA	NA	NA	NA
2.2.1.11	Location of the catalytic converter(s) (places and max/min distances from engine):	NA	NA	NA	NA	NA	NA
2.2.1.12	Normal operating range (K):	NA	NA	NA	NA	NA	NA
2.2.1.13	Consumable reagent (where appropriate):	NA	NA	NA	NA	NA	NA
2.2.1.13.1	Type and concentration of reagent needed for catalytic action:	NA	NA	NA	NA	NA	NA
2.2.1.13.2	Normal operational temperature range of reagent (K):	NA	NA	NA	NA	NA	NA
2.2.1.13.3	International standard (where appropriate):	NA	NA	NA	NA	NA	NA
2.2.1.14	NOx sensor: yes/no[2]	NA	NA	NA	NA	NA	NA
2.2.2	**Oxygen sensor: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.2.1	Make:	NA	NA	NA	NA	NA	NA
2.2.2.2	Type	NA	NA	NA	NA	NA	NA
2.2.2.3	Location	NA	NA	NA	NA	NA	NA
2.2.3	**Air injection: yes/no**[2]	No	No	No	No	No	No
2.2.3.1	Type (pulse air, air pump, etc.):	NA	NA	NA	NA	NA	NA
2.2.4	**EGR: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.4.1	Characteristics (cooled/uncooled, high pressure/low pressure, etc.):	NA	NA	NA	NA	NA	NA
2.2.5	**Particulate trap: yes/no**	NA	NA	NA	NA	NA	NA
2.2.5.1	Dimensions and capacity of the particulate trap	NA	NA	NA	NA	NA	NA
2.2.5.2	Type and design of the particulate trap	NA	NA	NA	NA	NA	NA
2.2.5.3	Location (places and max/min distance(s) from engine):	NA	NA	NA	NA	NA	NA
2.2.5.4	Method or system of regeneration, description, and/or drawing:	NA	NA	NA	NA	NA	NA
2.2.5.5	Normal operating temperature (K) and pressure (kPa) range:	NA	NA	NA	NA	NA	NA
2.2.6	**Other systems: yes/no**	NA	NA	NA	NA	NA	NA
2.2.6.1	Description and operation:						
3.	**Fuel feed**						
3.1	**Feed pump**						
	Pressure[1] and/or char. diagram (kPa):	550 ± 117	550 ± 117	550 ± 117	550 ± 117	550 ± 117	550 ± 117

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1.	**Descrip. of engine**	770 (41)	735 (42)	IND (43)	PL83 (44)	PL87 (45)	R2900 (46)
3.2	**Injection system**						
3.2.1	**Pump**						
3.2.1.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.1.2	Type(s):	Part no. 3740750	Part no. 3740750	Part no. 2530616	Part no. 3740750	Part no. 3740750	Part no. 3740750
3.2.1.3	Fuel Delivery:						
a	rated mm3	271	254	318	200	231	245
b	rated rpm	1800	1800	2100	1850	1800	1900
c	pk tq mm3	310	327	395	302	308	315
d	pk tq rpm	1300	1350	1400	1300	1200	1425
e	On eng./on pump bench[2]:	On engine	On engine	On engine	On engine	On engine	On engine
3.2.1.4	**Injection advance**						
3.2.1.4.1	Injec. adv. curve[1]:	Electronic	Electronic	Electronic	Electronic	Electronic	Electronic
3.2.1.4.2	Timing[1]:	Electronic	Electronic	Electronic	Electronic	Electronic	Electronic
3.2.2	**Injection piping**						
3.2.2.1	Length (mm):	NA	NA	NA	NA	NA	NA
3.2.2.2	Internal diam. (mm):	NA	NA	NA	NA	NA	NA
3.2.3	**Injector(s)**						
3.2.3.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.3.2	Type(s):	Part no. 3740750	Part no. 3740750	Part no. 2530616	Part no. 3740750	Part no. 3740750	Part no. 3740750
3.2.3.3	Opening press.[1] or charac. diag. (kPa):	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa
3.2.4	**Governor**						
3.2.4.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.4.2	Type(s):	Electronics group part no. 3309714	Electronics group part no. 3436116	Electronics group part no. 3684584	Electronics group part no. 3699510	Electronics group part no. 3699517	Electronics group part no. 2502824
3.2.4.3	Spd. where cut-off st. und. full ld (rpm)[1]:	1800 ± 10	1800 ± 10	2100 ± 10	1850 ± 10	1800 ± 10	1900 ± 10
3.2.4.4	Maximum no-load speed (rpm)[1]:	2200 ± 10	2105 ± 10	2310 ± 10	2200 ± 10	2200 ± 10	2120 ± 10
3.2.4.5	Idling speed (rpm)[1]:	650	700	700	700	700	800 ± 10
3.3	**Cold Start System[3]**						
3.3.1	Make(s):	NA	NA	NA	NA	NA	NA
3.3.2	Type (s):	Ether Aid	Ether Aid	Ether Aid	Ether Aid	Ether Aid	Ether Aid
3.3.3	Description:	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold
4.	**Valve Timing**						
4.1	Max. lift and angl in dead cntrs or eq. data:	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)
4.2	~~Reference and/or~~ setting ranges[2]:	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC

[1] - Specify the tolerance.
[2] - Strike out what does not apply
[3] Cold start aids:

Appendix 2 - ESSENTIAL CHARACTERISTICS OF THE ENGINE FAMILY

1.	**Common parameters:**						
1.1	Combustion cycle:	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke
1.2	Cooling medium:	water	water	water	water	water	water
1.3	Method of air aspir:	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled
1.4	Comb. cham. type/des.	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder
1.5	Valve and porting-config., size, and num.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.
1.6	Fuel system	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection
1.7	Eng. Manag. Systems						
	Prf. of ident. pursuant to dr. #'s:						
1.7.1	Chrg. cooling system:	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM
1.7.2	Exst. gas recirc.[1]	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
1.7.3	Water inj./emul. [1]:	NA	NA	NA	NA	NA	NA
1.7.4	Air injection[1]:	NA	NA	NA	NA	NA	NA
1.8	Exhaust. after-treatment system[1]:	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
	Prf. of ident. ratio:						
2.	**Engine Family Listing**						
2.1	Name of engine family:	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW
2.2	**Spec. of eng. in fam:**						
a	Engine Type	11383	11430	11674	11901	11902	1733
b	No. of cylinders	6	6	6	6	6	6
c	Rated Speed (rpm)	1800	1800	2100	1850	1800	1900
d	Fuel del. per stroke @ rated (mm3)	271	254	318	318	318	245
e	Rated Net Power (kW)	343	325	432.5	259	294	325
f	Maximum power speed (min^{-1})	1800	1800	2100	1800	1800	1900
g	Maximum net power (kW)	343	325	433	271	294	325
h	Max. Torque Speed (rpm)	1300	1350	1400	1300	1200	1425
i	Fuel del. per stroke @ max. torque (mm3)	310	327	395	302	308	315
j	Max. Torque (Nm)	2084	2290	2596	1964	2031	2085
k	Low Idle Speed (rpm)	650	700	700	700	700	800
l	Cylin. displ. (in % of parent eng.)	100%	100%	100%	100%	100%	100%

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	Engine Family
1.	**General**
1.1	Make (Name of undertaking)
1.2	Type and comm. descrip. of parent and family engines
1.3	Manuf. type coding
1.4	Spec. of mach. to be propelled by engine
1.5	Name and address of Manufacturer
	Nm. and addr. Of manuf. Authorized rep. (if any)
1.6	Loc., coding and method of affixing of the eng. iden. num.
1.7	Loc. and method of affixing of the EC appr. Mark
1.8	Address(es) of assembly plant(s)
	Attachments
1.1	Essential charac-teristics of the parent engine(s)
1.2	Essential charac-teristics of the engine family
1.3	Essential charac-teristics of engine types within the family
2.	Characteristics of engine-related parts of the mobile machinery (if applicable)
3.	Photographs of the parent engine
4.	Any further attach-ments, if any:

Appendix 1 - ESSENTIAL CHARACTERISTICS OF THE (PARENT) ENGINE
Appendix 3 - ESSENTIAL CHARACTERISTICS OF ENGINE TYPE WITHIN THE FAMILY

1.	**Descrip. of engine**	R2900 (47)	R2900 (48)	AD30 (49)	R3000 (50)	374F (51)	RM500B (52)
1.1	Manufacturer:	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
1.2	Manufac. engine code:	1690	1689	1710	12109	13885	20519
1.3	Cycle: four stroke / two stroke[2]:	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke
1.4	Bore (mm):	137.2	137.2	137.2	137.2	137.2	137.2
1.5	Stroke (mm):	171.4	171.4	171.4	171.4	171.4	171.4
1.6	Number and layout of cylinders:	6	6	6	6	6	6
1.7	Engine capac. (cm3):	15200	15200	15200	15200	15200	15200
1.8	Rated speed (rpm):	1900	1800	1800	1800	1600	2000
1.9	Max. torque speed (rpm):	1425	1350	1200	1200	1400	1400
1.10	Volumetric compression ratio[1]:	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1
1.11	Combustion system description:	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection
1.12	Drwg of comb. chamber and piston	See attachment	See attachment	See attachment	See attachment	See attachment	See attachment
1.13	Min cross sect. area of inlet and outlet ports:	See attachment	See attachment	See attachment	See attachment	See attachment	See attachment
1.14	**Cooling system**						
1.14.1	**Liquid**						
1.14.1.1	Nature of liquid:	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture
1.14.1.2	Circulating pump(s): yes/no[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.14.1.3	Charac. or make(s) and type(s) (if appl.):	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal
1.14.1.4	Drive ratio(s) (if applicable):	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1
1.14.2	**Air**						
1.14.2.1	Blower: yes/no[2]	No	No	No	No	No	No
1.14.2.2	Charac. or make(s) and type(s) (if appl.):	NA	NA	NA	NA	NA	NA
1.14.2.3	Drive ratio(s) (if applicable):	NA	NA	NA	NA	NA	NA
1.15	**Temp. permitted by the manufac.**						
1.15.1	Liquid cooling: Max. temp. at outlet (K):	377	377	377	377	377	377
1.15.2	Air cooling: Ref. pt.:	NA	NA	NA	NA	NA	NA
	Max. temp. at reference point (K):	NA	NA	NA	NA	NA	NA
1.15.3	Max temp of the inlet intrclr (if app) (K):	323	323	323	323	323	323
1.15.4	Max exhst temp at exit of exhst mnfld. (K):	869	867	925	925	905	956
1.15.5	Fuel temp. (K): min:	NA	NA	NA	NA	NA	NA
	Fuel temp. (K): max:	352	352	352	352	352	352
1.15.6	Lube temp. (K): min:	NA	NA	NA	NA	NA	NA
	Lube temp. (K): max:	383	383	383	383	383	383

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1.	**Descrip. of engine**	R2900 (47)	R2900 (48)	AD30 (49)	R3000 (50)	374F (51)	RM500B (52)
1.16	**Press. charg.: y/n**[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.16.1	Make:	Honeywell	Honeywell	Honeywell	Honeywell	Honeywell	Honeywell
1.16.2	Type:	3963874	3963874	3827900	3756145 5313013	***5523753***	4419561
1.16.3	Descrip. of syst. (eg. max press, if appl.):	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal
1.16.4	Intercooler: yes/no[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.17	Maximum inlet restr. (kPa)	3.7	3.7	3.7	3.7	3.7	3.7
1.18	Max exhst backpress. (kPa)	10	10	10	10	10	10
2.	**Measures taken against air pollution**						
2.1	Device for recycling crankcase gases: yes/no	No	No	No	No	No	No
2.2	Add. anti-poll. dev.-Descrip. and/or diag:	NA	NA	NA	NA	NA	NA
2.2.1	**Catalytic converter: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.1.1	Make:	NA	NA	NA	NA	NA	NA
2.2.1.2	Type:	NA	NA	NA	NA	NA	NA
2.2.1.3	Number of catalytic converters and elements	NA	NA	NA	NA	NA	NA
2.2.1.4	Dimensions and volume of the catalytic converter:	NA	NA	NA	NA	NA	NA
2.2.1.5	Type of catalytic action:	NA	NA	NA	NA	NA	NA
2.2.1.6	Total charge of precious metals:	NA	NA	NA	NA	NA	NA
2.2.1.7	Relative concentration:	NA	NA	NA	NA	NA	NA
2.2.1.8	Substrate (structure and material):	NA	NA	NA	NA	NA	NA
2.2.1.9	Cell density:	NA	NA	NA	NA	NA	NA
2.2.1.10	Type of casing for the catalytic converter(s):	NA	NA	NA	NA	NA	NA
2.2.1.11	Location of the catalytic converter(s) (places and max/min distances from engine):	NA	NA	NA	NA	NA	NA
2.2.1.12	Normal operating range (K):	NA	NA	NA	NA	NA	NA
2.2.1.13	Consumable reagent (where appropriate):	NA	NA	NA	NA	NA	NA
2.2.1.13.1	Type and concentration of reagent needed for catalytic action:	NA	NA	NA	NA	NA	NA
2.2.1.13.2	Normal operational temperature range of reagent (K):	NA	NA	NA	NA	NA	NA
2.2.1.13.3	International standard (where appropriate):	NA	NA	NA	NA	NA	NA
2.2.1.14	NOx sensor: yes/no[2]	NA	NA	NA	NA	NA	NA
2.2.2	**Oxygen sensor: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.2.1	Make:	NA	NA	NA	NA	NA	NA
2.2.2.2	Type	NA	NA	NA	NA	NA	NA
2.2.2.3	Location	NA	NA	NA	NA	NA	NA
2.2.3	**Air injection: yes/no**[2]	No	No	No	No	No	No
2.2.3.1	Type (pulse air, air pump, etc.):	NA	NA	NA	NA	NA	NA
2.2.4	**EGR: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.4.1	Characteristics (cooled/uncooled, high pressure/low pressure, etc.):	NA	NA	NA	NA	NA	NA
2.2.5	**Particulate trap: yes/no**	NA	NA	NA	NA	NA	NA
2.2.5.1	Dimensions and capacity of the particulate trap	NA	NA	NA	NA	NA	NA
2.2.5.2	Type and design of the particulate trap	NA	NA	NA	NA	NA	NA
2.2.5.3	Location (places and max/min distance(s) from engine):	NA	NA	NA	NA	NA	NA
2.2.5.4	Method or system of regeneration, description, and/or drawing:	NA	NA	NA	NA	NA	NA
2.2.5.5	Normal operating temperature (K) and pressure (kPa) range:	NA	NA	NA	NA	NA	NA
2.2.6	**Other systems: yes/no**	NA	NA	NA	NA	NA	NA
2.2.6.1	Description and operation:						
3.	**Fuel feed**						
3.1	**Feed pump**						
	Pressure[1] and/or char. diagram (kPa):	550 ± 117	550 ± 117	550 ± 117	550 ± 117	550 ± 117	550 ± 117

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1.	**Descrip. of engine**	R2900 (47)	R2900 (48)	AD30 (49)	R3000 (50)	374F (51)	RM500B (52)
3.2	**Injection system**						
3.2.1	**Pump**						
3.2.1.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.1.2	Type(s):	Part no. 3740750	Part no. 3740750	Part no. 3740750	Part no. 3740750	Part no. 2530616	Part no. 2530616
3.2.1.3	Fuel Delivery:						
a	rated mm3	240	261	238	238	313	288
b	rated rpm	1900	1800	1800	1800	1600	2000
c	pk tq mm3	272	269	318	318	339	352
d	pk tq rpm	1425	1350	1200	1200	1400	1400
e	On eng./on pump bench[2]:	On engine	On engine	On engine	On engine	On engine	On engine
3.2.1.4	**Injection advance**						
3.2.1.4.1	Injec. adv. curve[1]:	Electronic	Electronic	Electronic	Electronic	Electronic	Electronic
3.2.1.4.2	Timing[1]:	Electronic	Electronic	Electronic	Electronic	Electronic	Electronic
3.2.2	**Injection piping**						
3.2.2.1	Length (mm):	NA	NA	NA	NA	NA	NA
3.2.2.2	Internal diam. (mm):	NA	NA	NA	NA	NA	NA
3.2.3	**Injector(s)**						
3.2.3.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.3.2	Type(s):	Part no. 3740750	Part no. 3740750	Part no. 3740750	Part no. 3740750	Part no. 2530616	Part no. 2530616
3.2.3.3	Opening press.[1] or charac. diag. (kPa):	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa
3.2.4	**Governor**						
3.2.4.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.4.2	Type(s):	Electronics group part no. 2502824	Electronics group part no. 2502824	Electronics group part no. 2502815	Electronics group part no. 3874564	Electronics group part no. 4237012	Electronics group part no. 4451989
3.2.4.3	Spd. where cut-off st. und. full ld (rpm)[1]:	1900 ± 10	1800 ± 10	1800 ± 10	1800 ± 10	1600 ± 10	2000 ± 10
3.2.4.4	Maximum no-load speed (rpm)[1]:	2120 ± 10	2120 ± 10	2330 ± 10	2120 ± 10	1800 ± 10	2200 ± 10
3.2.4.5	Idling speed (rpm)[1]:	800 ± 10	800 ± 10	700 ± 10	800 ± 10	800 ± 10	1100 ± 10
3.3	**Cold Start System[3]**						
3.3.1	Make(s):	NA	NA	NA	NA	NA	NA
3.3.2	Type (s):	Ether Aid	Ether Aid	Ether Aid	Ether Aid	Ether Aid	Ether Aid
3.3.3	Description:	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold
4.	**Valve Timing**						
4.1	Max. lift and angl in dead cntrs or eq. data:	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)
4.2	~~Reference and/or~~ setting ranges[2]:	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC

[1] - Specify the tolerance.
[2] - Strike out what does not apply
[3] Cold start aids:

Appendix 2 - ESSENTIAL CHARACTERISTICS OF THE ENGINE FAMILY

1.	**Common parameters:**						
1.1	Combustion cycle:	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke
1.2	Cooling medium:	water	water	water	water	water	water
1.3	Method of air aspir:	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled
1.4	Comb. cham. type/des.	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder
1.5	Valve and porting-config., size, and num.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.
1.6	Fuel system	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection
1.7	Eng. Manag. Systems						
	Prf. of ident. pursuant to dr. #'s:						
1.7.1	Chrg. cooling system:	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM
1.7.2	Exst. gas recirc.[1]	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
1.7.3	Water inj./emul.[1]:	NA	NA	NA	NA	NA	NA
1.7.4	Air injection[1]:	NA	NA	NA	NA	NA	NA
1.8	Exhaust. after-treatment system[1]:	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
	Prf. of ident. ratio:						
2.	**Engine Family Listing**						
2.1	Name of engine family:	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW
2.2	**Spec. of eng. in fam:**						
a	Engine Type	1690	1689	1710	12109	13885	20519
b	No. of cylinders	6	6	6	6	6	6
c	Rated Speed (rpm)	1900	1800	1800	1800	1600	2000
d	Fuel del. per stroke @ rated (mm3)	240	261	238	238	313	288
e	Rated Net Power (kW)	321	333	305	305	366	403
f	Maximum power speed (min^{-1})	1900	1800	1800	1800	1600	2000
g	Maximum net power (kW)	321	333	305	305	366	403
h	Max. Torque Speed (rpm)	1425	1350	1200	1200	1400	1400
i	Fuel del. per stroke @ max. torque (mm3)	272	269	318	318	339	352
j	Max. Torque (Nm)	1792	1770	2117	2117	2387	2355
k	Low Idle Speed (rpm)	800	800	700	800	800	1100
l	Cylin. displ. (in % of parent eng.)	100%	100%	100%	100%	100%	100%

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	Engine Family
1.	**General**
1.1	Make (Name of undertaking)
1.2	Type and comm. descrip. of parent and family engines
1.3	Manuf. type coding
1.4	Spec. of mach. to be propelled by engine
1.5	Name and address of Manufacturer
	Nm. and addr. Of manuf. Authorized rep. (if any)
1.6	Loc., coding and method of affixing of the eng. iden. num.
1.7	Loc. and method of affixing of the EC appr. Mark
1.8	Address(es) of assembly plant(s)
	Attachments
1.1	Essential charac-teristics of the parent engine(s)
1.2	Essential charac-teristics of the engine family
1.3	Essential charac-teristics of engine types within the family
2.	Characteristics of engine-related parts of the mobile machinery (if applicable)
3.	Photographs of the parent engine
4.	Any further attach-ments, if any:

Appendix 1 - ESSENTIAL CHARACTERISTICS OF THE (PARENT) ENGINE
Appendix 3 - ESSENTIAL CHARACTERISTICS OF ENGINE TYPE WITHIN THE FAMILY

1.	**Descrip. of engine**	820K (53)	735C (54)	986H (55)	PL83 / PL87 (56)	770G (57)	IND (58)
1.1	Manufacturer:	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc. branded as Perkins
1.2	Manufac. engine code:	14789	13006	39845	32168	11851	29899
1.3	Cycle: four stroke / two stroke[2]:	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke
1.4	Bore (mm):	137.2	137.2	137.2	137.2	137.2	137.2
1.5	Stroke (mm):	171.4	171.4	171.4	171.4	171.4	171.4
1.6	Number and layout of cylinders:	6	6	6	6	6	6
1.7	Engine capac. (cm3):	15200	15200	15200	15200	15200	15200
1.8	Rated speed (rpm):	1800	1800	1800	1850	1800	1800
1.9	Max. torque speed (rpm):	1300	1350	1350	1300	1300	1400
1.10	Volumetric compression ratio[1]:	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1
1.11	Combustion system description:	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection
1.12	Drwg of comb. chamber and piston	See attachment	See attachment	See attachment	See attachment	See attachment	See attachment
1.13	Min cross sect. area of inlet and outlet ports:	See attachment	See attachment	See attachment	See attachment	See attachment	See attachment
1.14	**Cooling system**						
1.14.1	**Liquid**						
1.14.1.1	Nature of liquid:	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture
1.14.1.2	Circulating pump(s): yes/no[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.14.1.3	Charac. or make(s) and type(s) (if appl.):	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal
1.14.1.4	Drive ratio(s) (if applicable):	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1
1.14.2	**Air**						
1.14.2.1	Blower: yes/no[2]	No	No	No	No	No	No
1.14.2.2	Charac. or make(s) and type(s) (if appl.):	NA	NA	NA	NA	NA	NA
1.14.2.3	Drive ratio(s) (if applicable):	NA	NA	NA	NA	NA	NA
1.15	**Temp. permitted by the manufac.**						
1.15.1	Liquid cooling: Max. temp. at outlet (K):	377	377	377	377	377	377
1.15.2	Air cooling: Ref. pt.:	NA	NA	NA	NA	NA	NA
	Max. temp. at reference point (K):	NA	NA	NA	NA	NA	NA
1.15.3	Max temp of the inlet intrclr (if app) (K):	323	323	323	323	323	323
1.15.4	Max exhst temp at exit of exhst mnfld. (K):	884	930	930	850	850	940
1.15.5	Fuel temp. (K): min:	NA	NA	NA	NA	NA	NA
	Fuel temp. (K): max:	352	352	352	352	352	352
1.15.6	Lube temp. (K): min:	NA	NA	NA	NA	NA	NA
	Lube temp. (K): max:	383	383	383	383	383	383

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1.	**Descrip. of engine**	820K (53)	735C (54)	986H (55)	PL83 / PL87 (56)	770G (57)	IND (58)
1.16	**Press. charg.: y/n**[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.16.1	Make:	Honeywell	Honeywell	Honeywell	Honeywell	Honeywell	Honeywell
1.16.2	Type:	3927914 3927918	3620853	4172663	4830845	3808701	2367659
1.16.3	Descrip. of syst. (eg. max press, if appl.):	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal
1.16.4	Intercooler: yes/no[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.17	Maximum inlet restr. (kPa)	3.7	3.7	3.7	3.7	3.7	3.7
1.18	Max exhst backpress. (kPa)	10	10	10	10	10	10
2.	**Measures taken against air pollution**						
2.1	Device for recycling crankcase gases: yes/no	No	No	No	No	No	No
2.2	Add. anti-poll. dev.-Descrip. and/or diag:	NA	NA	NA	NA	NA	NA
2.2.1	**Catalytic converter: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.1.1	Make:	NA	NA	NA	NA	NA	NA
2.2.1.2	Type:	NA	NA	NA	NA	NA	NA
2.2.1.3	Number of catalytic converters and elements	NA	NA	NA	NA	NA	NA
2.2.1.4	Dimensions and volume of the catalytic converter:	NA	NA	NA	NA	NA	NA
2.2.1.5	Type of catalytic action:	NA	NA	NA	NA	NA	NA
2.2.1.6	Total charge of precious metals:	NA	NA	NA	NA	NA	NA
2.2.1.7	Relative concentration:	NA	NA	NA	NA	NA	NA
2.2.1.8	Substrate (structure and material):	NA	NA	NA	NA	NA	NA
2.2.1.9	Cell density:	NA	NA	NA	NA	NA	NA
2.2.1.10	Type of casing for the catalytic converter(s):	NA	NA	NA	NA	NA	NA
2.2.1.11	Location of the catalytic converter(s) (places and max/min distances from engine):	NA	NA	NA	NA	NA	NA
2.2.1.12	Normal operating range (K):	NA	NA	NA	NA	NA	NA
2.2.1.13	Consumable reagent (where appropriate):	NA	NA	NA	NA	NA	NA
2.2.1.13.1	Type and concentration of reagent needed for catalytic action:	NA	NA	NA	NA	NA	NA
2.2.1.13.2	Normal operational temperature range of reagent (K):	NA	NA	NA	NA	NA	NA
2.2.1.13.3	International standard (where appropriate):	NA	NA	NA	NA	NA	NA
2.2.1.14	NOx sensor: yes/no[2]	NA	NA	NA	NA	NA	NA
2.2.2	**Oxygen sensor: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.2.1	Make:	NA	NA	NA	NA	NA	NA
2.2.2.2	Type	NA	NA	NA	NA	NA	NA
2.2.2.3	Location	NA	NA	NA	NA	NA	NA
2.2.3	**Air injection: yes/no**[2]	No	No	No	No	No	No
2.2.3.1	Type (pulse air, air pump, etc.):	NA	NA	NA	NA	NA	NA
2.2.4	**EGR: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.4.1	Characteristics (cooled/uncooled, high pressure/low pressure, etc.):	NA	NA	NA	NA	NA	NA
2.2.5	**Particulate trap: yes/no**	NA	NA	NA	NA	NA	NA
2.2.5.1	Dimensions and capacity of the particulate trap	NA	NA	NA	NA	NA	NA
2.2.5.2	Type and design of the particulate trap	NA	NA	NA	NA	NA	NA
2.2.5.3	Location (places and max/min distance(s) from engine):	NA	NA	NA	NA	NA	NA
2.2.5.4	Method or system of regeneration, description, and/or drawing:	NA	NA	NA	NA	NA	NA
2.2.5.5	Normal operating temperature (K) and pressure (kPa) range:	NA	NA	NA	NA	NA	NA
2.2.6	**Other systems: yes/no**	NA	NA	NA	NA	NA	NA
2.2.6.1	Description and operation:						
3.	**Fuel feed**						
3.1	**Feed pump**						
	Pressure[1] and/or char. diagram (kPa):	550 ± 117	550 ± 117	550 ± 117	550 ± 117	550 ± 117	550 ± 117

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1.	**Descrip. of engine**	820K (53)	735C (54)	986H (55)	PL83 / PL87 (56)	770G (57)	IND (58)
3.2	**Injection system**						
3.2.1	**Pump**						
3.2.1.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.1.2	Type(s):	Part no. 2530616	Part no. 3556110	Part no. 3556110	Part no. 3556110	Part no. 3740750	Part no. 4666771
3.2.1.3	Fuel Delivery:						
a	rated mm3	255	277	284	207	293	270
b	rated rpm	1800	1800	1800	1850	1800	1800
c	pk tq mm3	313	337	350	280	339	327
d	pk tq rpm	1300	1350	1350	1300	1300	1400
e	On eng./on pump bench[2]:	On engine	On engine	On engine	On engine	On engine	On engine
3.2.1.4	**Injection advance**						
3.2.1.4.1	Injec. adv. curve[1]:	Electronic	Electronic	Electronic	Electronic	Electronic	Electronic
3.2.1.4.2	Timing[1]:	Electronic	Electronic	Electronic	Electronic	Electronic	Electronic
3.2.2	**Injection piping**						
3.2.2.1	Length (mm):	NA	NA	NA	NA	NA	NA
3.2.2.2	Internal diam. (mm):	NA	NA	NA	NA	NA	NA
3.2.3	**Injector(s)**						
3.2.3.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.3.2	Type(s):	Part no. 2530616	Part no. 3556110	Part no. 3556110	Part no. 3556110	Part no. 3740750	Part no. 4666771
3.2.3.3	Opening press.[1] or charac. diag. (kPa):	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa
3.2.4	**Governor**						
3.2.4.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.4.2	Type(s):	Electronics group part no. 4155659	Electronics group part no. 3903820	Electronics group part no. 4804803	Electronics group part no. 4597538	Electronics group part no. 3661377	Electronics group part no. 4744132
3.2.4.3	Spd. where cut-off st. und. full ld (rpm)[1]:	1800 ± 10	1800 ± 10	1800 ± 10	1850 ± 10	1800 ± 10	1800 ± 10
3.2.4.4	Maximum no-load speed (rpm)[1]:	2300 ± 10	2100 ± 10	2165 ± 10	2200 ± 10	2200 ± 10	2310 ± 10
3.2.4.5	Idling speed (rpm)[1]:	800 ± 10	700 ± 10	850 ± 10	700 ± 10	650 ± 10	700 ± 10
3.3	**Cold Start System[3]**						
3.3.1	Make(s):	NA	NA	NA	NA	NA	NA
3.3.2	Type (s):	Ether Aid	Ether Aid	Ether Aid	Ether Aid	Ether Aid	Ether Aid
3.3.3	Description:	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold
4.	**Valve Timing**						
4.1	Max. lift and angl in dead cntrs or eq. data:	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)
4.2	~~Reference and/or~~ setting ranges[2]:	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC

[1] - Specify the tolerance.
[2] - Strike out what does not apply
[3] Cold start aids:

Appendix 2 - ESSENTIAL CHARACTERISTICS OF THE ENGINE FAMILY

1.	**Common parameters:**						
1.1	Combustion cycle:	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke
1.2	Cooling medium:	water	water	water	water	water	water
1.3	Method of air aspir:	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled
1.4	Comb. cham. type/des.	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder
1.5	Valve and porting-config., size, and num.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.
1.6	Fuel system	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection
1.7	Eng. Manag. Systems						
	Prf. of ident. pursuant to dr. #'s:						
1.7.1	Chrg. cooling system:	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM
1.7.2	Exst. gas recirc.[1]	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
1.7.3	Water inj./emul. [1]:	NA	NA	NA	NA	NA	NA
1.7.4	Air injection[1]:	NA	NA	NA	NA	NA	NA
1.8	Exhaust. after-treatment system[1]:	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
	Prf. of ident. ratio:						
2.	**Engine Family Listing**						
2.1	Name of engine family:	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW
2.2	**Spec. of eng. in fam:**						
a	Engine Type	14789	13006	39845	32168	11851	29899
b	No. of cylinders	6	6	6	6	6	6
c	Rated Speed (rpm)	1800	1800	1800	1850	1800	1800
d	Fuel del. per stroke @ rated (mm3)	255	277	284	207	293	270
e	Rated Net Power (kW)	318	335	335	263	381	354
f	Maximum power speed (min^{-1})	1800	1600	1600	1600	1800	1800
g	Maximum net power (kW)	318	338	338	273	381	354
h	Max. Torque Speed (rpm)	1300	1350	1350	1300	1300	1400
i	Fuel del. per stroke @ max. torque (mm3)	313	337	350	280	339	327
j	Max. Torque (Nm)	2160	2320	2320	1966	2320	2171
k	Low Idle Speed (rpm)	800	700	850	700	650	700
l	Cylin. displ. (in % of parent eng.)	100%	100%	100%	100%	100%	100%

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	Engine Family
1.	**General**
1.1	Make (Name of undertaking)
1.2	Type and comm. descrip. of parent and family engines
1.3	Manuf. type coding
1.4	Spec. of mach. to be propelled by engine
1.5	Name and address of Manufacturer
	Nm. and addr. Of manuf. Authorized rep. (if any)
1.6	Loc., coding and method of affixing of the eng. iden. num.
1.7	Loc. and method of affixing of the EC appr. Mark
1.8	Address(es) of assembly plant(s)
	Attachments
1.1	Essential charac-teristics of the parent engine(s)
1.2	Essential charac-teristics of the engine family
1.3	Essential charac-teristics of engine types within the family
2.	Characteristics of engine-related parts of the mobile machinery (if applicable)
3.	Photographs of the parent engine
4.	Any further attach-ments, if any:

Appendix 1 - ESSENTIAL CHARACTERISTICS OF THE (PARENT) ENGINE
Appendix 3 - ESSENTIAL CHARACTERISTICS OF ENGINE TYPE WITHIN THE FAMILY

	Descrip. of engine	D8R/T (59)	986K (60)	IND (61)	IND (62)	IND (63)	IND (64)
1.1	Manufacturer:	Caterpillar Inc.	Caterpillar Inc. branded as Perkins	Caterpillar Inc. branded as Perkins	Caterpillar Inc. branded as Perkins	Caterpillar Inc. branded as Perkins	Caterpillar Inc. branded as Perkins
1.2	Manufac. engine code:	34065	55625	55645	55650	55452	55460
1.3	Cycle: four stroke / two stroke[2]:	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke
1.4	Bore (mm):	137.2	137.2	137.2	137.2	137.2	137.2
1.5	Stroke (mm):	171.4	171.4	171.4	171.4	171.4	171.4
1.6	Number and layout of cylinders:	6	6	6	6	6	6
1.7	Engine capac. (cm3):	15200	15200	15200	15200	15200	15200
1.8	Rated speed (rpm):	1850	1800	2100	2100	2100	2100
1.9	Max. torque speed (rpm):	1300	1350	1400	1400	1400	1400
1.10	Volumetric compression ratio[1]:	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1	18.0 ± 0.5:1
1.11	Combustion system description:	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection
1.12	Drwg of comb. chamber and piston	See attachment	See attachment	See attachment	See attachment	See attachment	See attachment
1.13	Min cross sect. area of inlet and outlet ports:	See attachment	See attachment	See attachment	See attachment	See attachment	See attachment
1.14	**Cooling system**						
1.14.1	**Liquid**						
1.14.1.1	Nature of liquid:	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture	Water/glycol mixture
1.14.1.2	Circulating pump(s): yes/no[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.14.1.3	Charac. or make(s) and type(s) (if appl.):	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal
1.14.1.4	Drive ratio(s) (if applicable):	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1
1.14.2	**Air**						
1.14.2.1	Blower: yes/no[2]	No	No	No	No	No	No
1.14.2.2	Charac. or make(s) and type(s) (if appl.):	NA	NA	NA	NA	NA	NA
1.14.2.3	Drive ratio(s) (if applicable):	NA	NA	NA	NA	NA	NA
1.15	**Temp. permitted by the manufac.**						
1.15.1	Liquid cooling: Max. temp. at outlet (K):	377	377	377	377	377	377
1.15.2	Air cooling: Ref. pt.:	NA	NA	NA	NA	NA	NA
	Max. temp. at reference point (K):	NA	NA	NA	NA	NA	NA
1.15.3	Max temp of the inlet intrclr (if app) (K):	323	323	323	323	323	323
1.15.4	Max exhst temp at exit of exhst mnfld. (K):	940	940	940	940	940	940
1.15.5	Fuel temp. (K): min:	NA	NA	NA	NA	NA	NA
	Fuel temp. (K): max:	352	352	352	352	352	352
1.15.6	Lube temp. (K): min:	NA	NA	NA	NA	NA	NA
	Lube temp. (K): max:	383	383	383	383	383	383

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1.	**Descrip. of engine**	D8R/T (59)	986K (60)	IND (61)	IND (62)	IND (63)	IND (64)
1.16	**Press. charg.: y/n**[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.16.1	Make:	Honeywell	Honeywell	Honeywell	Honeywell	Honeywell	Honeywell
1.16.2	Type:	4830845	3620853	2367659 3620855	2367659 3620855	2400003 2520804 2621071 2824394	2400003 2520804 2621071 2824394
1.16.3	Descrip. of syst. (eg. max press, if appl.):	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal	Exhaust driven centrifugal
1.16.4	Intercooler: yes/no[2]	Yes	Yes	Yes	Yes	Yes	Yes
1.17	Maximum inlet restr. (kPa)	3.7	3.7	3.7	3.7	3.7	3.7
1.18	Max exhst backpress. (kPa)	10	10	10	10	10	10
2.	**Measures taken against air pollution**						
2.1	Device for recycling crankcase gases: yes/no	No	No	No	No	No	No
2.2	Add. anti-poll. dev.-Descrip. and/or diag:	NA	NA	NA	NA	NA	NA
2.2.1	**Catalytic converter: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.1.1	Make:	NA	NA	NA	NA	NA	NA
2.2.1.2	Type:	NA	NA	NA	NA	NA	NA
2.2.1.3	Number of catalytic converters and elements	NA	NA	NA	NA	NA	NA
2.2.1.4	Dimensions and volume of the catalytic converter:	NA	NA	NA	NA	NA	NA
2.2.1.5	Type of catalytic action:	NA	NA	NA	NA	NA	NA
2.2.1.6	Total charge of precious metals:	NA	NA	NA	NA	NA	NA
2.2.1.7	Relative concentration:	NA	NA	NA	NA	NA	NA
2.2.1.8	Substrate (structure and material):	NA	NA	NA	NA	NA	NA
2.2.1.9	Cell density:	NA	NA	NA	NA	NA	NA
2.2.1.10	Type of casing for the catalytic converter(s):	NA	NA	NA	NA	NA	NA
2.2.1.11	Location of the catalytic converter(s) (places and max/min distances from engine):	NA	NA	NA	NA	NA	NA
2.2.1.12	Normal operating range (K):	NA	NA	NA	NA	NA	NA
2.2.1.13	Consumable reagent (where appropriate):	NA	NA	NA	NA	NA	NA
2.2.1.13.1	Type and concentration of reagent needed for catalytic action:	NA	NA	NA	NA	NA	NA
2.2.1.13.2	Normal operational temperature range of reagent (K):	NA	NA	NA	NA	NA	NA
2.2.1.13.3	International standard (where appropriate):	NA	NA	NA	NA	NA	NA
2.2.1.14	NOx sensor: yes/no[2]	NA	NA	NA	NA	NA	NA
2.2.2	**Oxygen sensor: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.2.1	Make:	NA	NA	NA	NA	NA	NA
2.2.2.2	Type	NA	NA	NA	NA	NA	NA
2.2.2.3	Location	NA	NA	NA	NA	NA	NA
2.2.3	**Air injection: yes/no**[2]	No	No	No	No	No	No
2.2.3.1	Type (pulse air, air pump, etc.):	NA	NA	NA	NA	NA	NA
2.2.4	**EGR: yes/no**[2]	NA	NA	NA	NA	NA	NA
2.2.4.1	Characteristics (cooled/uncooled, high pressure/low pressure, etc.):	NA	NA	NA	NA	NA	NA
2.2.5	**Particulate trap: yes/no**	NA	NA	NA	NA	NA	NA
2.2.5.1	Dimensions and capacity of the particulate trap	NA	NA	NA	NA	NA	NA
2.2.5.2	Type and design of the particulate trap	NA	NA	NA	NA	NA	NA
2.2.5.3	Location (places and max/min distance(s) from engine):	NA	NA	NA	NA	NA	NA
2.2.5.4	Method or system of regeneration, description, and/or drawing:	NA	NA	NA	NA	NA	NA
2.2.5.5	Normal operating temperature (K) and pressure (kPa) range:	NA	NA	NA	NA	NA	NA
2.2.6	**Other systems: yes/no**	NA	NA	NA	NA	NA	NA
2.2.6.1	Description and operation:						
3.	**Fuel feed**						
3.1	**Feed pump**						
	Pressure[1] and/or char. diagram (kPa):	550 ± 117	550 ± 117	550 ± 117	550 ± 117	550 ± 117	550 ± 117

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1.	**Descrip. of engine**	D8R/T (59)	986K (60)	IND (61)	IND (62)	IND (63)	IND (64)
3.2	**Injection system**						
3.2.1	**Pump**						
3.2.1.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.1.2	Type(s):	Part no. 3556110	Part no. 3556110	Part no.3740750	Part no.3740750	Part no. 2530616	Part no. 2530616
3.2.1.3	Fuel Delivery:						
a	rated mm3	206	277	239	270	318	343
b	rated rpm	1850	1800	2100	2100	2100	2100
c	pk tq mm3	278	337	314	327	368	389
d	pk tq rpm	1300	1350	1400	1400	1400	1400
e	On eng./on pump bench[2]:	On engine	On engine	On engine	On engine	On engine	On engine
3.2.1.4	**Injection advance**						
3.2.1.4.1	Injec. adv. curve[1]:	Electronic	Electronic	Electronic	Electronic	Electronic	Electronic
3.2.1.4.2	Timing[1]:	Electronic	Electronic	Electronic	Electronic	Electronic	Electronic
3.2.2	**Injection piping**						
3.2.2.1	Length (mm):	NA	NA	NA	NA	NA	NA
3.2.2.2	Internal diam. (mm):	NA	NA	NA	NA	NA	NA
3.2.3	**Injector(s)**						
3.2.3.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.3.2	Type(s):	Part no. 3556110	Part no. 3556110	Part no.3740750	Part no.3740750	Part no. 2530616	Part no. 2530616
3.2.3.3	Opening press.[1] or charac. diag. (kPa):	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa
3.2.4	**Governor**						
3.2.4.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
3.2.4.2	Type(s):	Electronics group part no. 4704825	Electronics group part no. 4804803	Electronics group part no. 5197812	Electronics group part no. 5197816	Electronics group part no. 5197820	Electronics group part no. 5197820
3.2.4.3	Spd. where cut-off st. und. full ld (rpm)[1]:	1850 ± 10	1800± 10	2100 ± 10	2100 ± 10	2100 ± 10	2100 ± 10
3.2.4.4	Maximum no-load speed (rpm)[1]:	2200 ± 10	2165± 10	2310 +10/-520	1980 +10/-190	1980 +10/-190	1980 +10/-190
3.2.4.5	Idling speed (rpm)[1]:	700 ± 10	850± 10	700 +710/-110	700 +710/-110	700 +710/-110	700 +710/-110
3.3	**Cold Start System[3]**						
3.3.1	Make(s):	NA	NA	NA	NA	NA	NA
3.3.2	Type (s):	Ether Aid	Ether Aid	Ether Aid	Ether Aid	Ether Aid	Ether Aid
3.3.3	Description:	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold	Ether injection into the intake manifold
4.	**Valve Timing**						
4.1	Max. lift and angl in dead cntrs or eq. data:	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)
4.2	~~Reference and/or~~ setting ranges[2]:	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC

[1] - Specify the tolerance.
[2] - Strike out what does not apply
[3] Cold start aids:

Appendix 2 - ESSENTIAL CHARACTERISTICS OF THE ENGINE FAMILY

1.	**Common parameters:**						
1.1	Combustion cycle:	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke	4 stroke
1.2	Cooling medium:	water	water	water	water	water	water
1.3	Method of air aspir:	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled
1.4	Comb. cham. type/des.	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder	Quiescent - Bullet Nose Crater crossflow, 2 intake & 2 exhaust valves/cylinder
1.5	Valve and porting-config., size, and num.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.
1.6	Fuel system	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection
1.7	Eng. Manag. Systems						
	Prf. of ident. pursuant to dr. #'s:						
1.7.1	Chrg. cooling system:	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM	Supplied by OEM
1.7.2	Exst. gas recirc.[1]	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
1.7.3	Water inj./emul. [1]:	NA	NA	NA	NA	NA	NA
1.7.4	Air injection[1]:	NA	NA	NA	NA	NA	NA
1.8	Exhaust. after-treatment system[1]:	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
	Prf. of ident. ratio:						
2.	**Engine Family Listing**						
2.1	Name of engine family:	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW	CPXL15.2ESW
2.2	**Spec. of eng. in fam:**						
a	Engine Type	34065	55625	55645	55650	55452	55460
b	No. of cylinders	6	6	6	6	6	6
c	Rated Speed (rpm)	1850	1800	2100	2100	2100	2100
d	Fuel del. per stroke @ rated (mm3)	206	277	239	270	403	432.5
e	Rated Net Power (kW)	258	335	328	354	318	343
f	Maximum power speed (min^{-1})	1600	1800	2100	2100	2100	2100
g	Maximum net power (kW)	269	335	328	354	403	432.5
h	Max. Torque Speed (rpm)	1300	1350	1400	1400	1400	1400
i	Fuel del. per stroke @ max. torque (mm3)	278	337	314	327	368	389
j	Max. Torque (Nm)	1941	2320	2010	2171	2464	2649
k	Low Idle Speed (rpm)	700	850	700	700	700	700
l	Cylin. displ. (in % of parent eng.)	100%	100%	100%	100%	100%	100%

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	Engine Family
1.	**General**
1.1	Make (Name of undertaking)
1.2	Type and comm. descrip. of parent and family engines
1.3	Manuf. type coding
1.4	Spec. of mach. to be propelled by engine
1.5	Name and address of Manufacturer
	Nm. and addr. Of manuf. Authorized rep. (if any)
1.6	Loc., coding and method of affixing of the eng. iden. num.
1.7	Loc. and method of affixing of the EC appr. Mark
1.8	Address(es) of assembly plant(s)
	Attachments
1.1	Essential charac-teristics of the parent engine(s)
1.2	Essential charac-teristics of the engine family
1.3	Essential charac-teristics of engine types within the family
2.	Characteristics of engine-related parts of the mobile machinery (if applicable)
3.	Photographs of the parent engine
4.	Any further attach-ments, if any:

Appendix 1 - ESSENTIAL CHARACTERISTICS OF THE (PARENT) ENGINE
Appendix 3 - ESSENTIAL CHARACTERISTICS OF ENGINE TYPE WITHIN THE FAMILY

	Descrip. of engine	IND (65)	740 (66)	***374 HEX*** ***(67)***
1.1	Manufacturer:	Caterpillar Inc. branded as Perkins	Caterpillar Inc.	***Caterpillar Inc.***
1.2	Manufac. engine code:	55469	62061	***63999***
1.3	Cycle: four stroke / two stroke[2]:	4 stroke	4 stroke	***4 stroke***
1.4	Bore (mm):	137.2	137.2	***137.2***
1.5	Stroke (mm):	171.4	171.4	***171.4***
1.6	Number and layout of cylinders:	6	6	***6***
1.7	Engine capac. (cm3):	15200	15200	***15200***
1.8	Rated speed (rpm):	2100	1800	***1600***
1.9	Max. torque speed (rpm):	1400	1350	***1400***
1.10	Volumetric compression ratio[1]:	18.0 ± 0.5:1	18.0 ± 0.5:1	***18.0 ± 0.5:1***
1.11	Combustion system description:	Direct Injection	Direct Injection	***Direct Injection***
1.12	Drwg of comb. chamber and piston	See attachment	See attachment	***See attachment***
1.13	Min cross sect. area of inlet and outlet ports:	See attachment	See attachment	***See attachment***
1.14	**Cooling system**			
1.14.1	**Liquid**			
1.14.1.1	Nature of liquid:	Water/glycol mixture	Water/glycol mixture	***Water/glycol mixture***
1.14.1.2	Circulating pump(s): yes/no[2]	Yes	Yes	***Yes***
1.14.1.3	Charac. or make(s) and type(s) (if appl.):	Caterpillar Inc. - gear driven centrifugal	Caterpillar Inc. - gear driven centrifugal	***Caterpillar Inc. - gear driven centrifugal***
1.14.1.4	Drive ratio(s) (if applicable):	1.1:1	1.1:1	***1.1:1***
1.14.2	**Air**			
1.14.2.1	Blower: yes/no[2]	No	No	***No***
1.14.2.2	Charac. or make(s) and type(s) (if appl.):	NA	NA	***NA***
1.14.2.3	Drive ratio(s) (if applicable):	NA	NA	***NA***
1.15	**Temp. permitted by the manufac.**			
1.15.1	Liquid cooling: Max. temp. at outlet (K):	377	377	***377***
1.15.2	Air cooling: Ref. pt.:	NA	NA	***NA***
	Max. temp. at reference point (K):	NA	NA	***NA***
1.15.3	Max temp of the inlet intrclr (if app) (K):	323	323	***323***
1.15.4	Max exhst temp at exit of exhst mnfld. (K):	940	940	***905***
1.15.5	Fuel temp. (K): min:	NA	NA	***NA***
	Fuel temp. (K): max:	352	352	***352***
1.15.6	Lube temp. (K): min:	NA	NA	***NA***
	Lube temp. (K): max:	383	383	***383***

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1.	**Descrip. of engine**	IND (65)	740 (66)	***374 HEX*** ***(67)***
1.16	**Press. charg.: y/n**[2]	Yes	Yes	***Yes***
1.16.1	Make:	Honeywell	Honeywell	***Honeywell***
1.16.2	Type:	2400003 2520804 2621071 2824394	3620853	***5298671***
1.16.3	Descrip. of syst. (eg. max press, if appl.):	Exhaust driven centrifugal	Exhaust driven centrifugal	***Exhaust driven centrifugal***
1.16.4	Intercooler: yes/no[2]	Yes	Yes	***Yes***
1.17	Maximum inlet restr. (kPa)	3.7	3.7	***3.7***
1.18	Max exhst backpress. (kPa)	10	10	***10***
2.	**Measures taken against air pollution**			
2.1	Device for recycling crankcase gases: yes/no	No	No	***No***
2.2	Add. anti-poll. dev.-Descrip. and/or diag:	NA	NA	***NA***
2.2.1	**Catalytic converter: yes/no**[2]	NA	NA	***NA***
2.2.1.1	Make:	NA	NA	***NA***
2.2.1.2	Type:	NA	NA	***NA***
2.2.1.3	Number of catalytic converters and elements	NA	NA	***NA***
2.2.1.4	Dimensions and volume of the catalytic converter:	NA	NA	***NA***
2.2.1.5	Type of catalytic action:	NA	NA	***NA***
2.2.1.6	Total charge of precious metals:	NA	NA	***NA***
2.2.1.7	Relative concentration:	NA	NA	***NA***
2.2.1.8	Substrate (structure and material):	NA	NA	***NA***
2.2.1.9	Cell density:	NA	NA	***NA***
2.2.1.10	Type of casing for the catalytic converter(s):	NA	NA	***NA***
2.2.1.11	Location of the catalytic converter(s) (places and max/min distances from engine):	NA	NA	***NA***
2.2.1.12	Normal operating range (K):	NA	NA	***NA***
2.2.1.13	Consumable reagent (where appropriate):	NA	NA	***NA***
2.2.1.13.1	Type and concentration of reagent needed for catalytic action:	NA	NA	***NA***
2.2.1.13.2	Normal operational temperature range of reagent (K):	NA	NA	***NA***
2.2.1.13.3	International standard (where appropriate):	NA	NA	***NA***
2.2.1.14	NOx sensor: yes/no[2]	NA	NA	***NA***
2.2.2	**Oxygen sensor: yes/no**[2]	NA	NA	***NA***
2.2.2.1	Make:	NA	NA	***NA***
2.2.2.2	Type	NA	NA	***NA***
2.2.2.3	Location	NA	NA	***NA***
2.2.3	**Air injection: yes/no**[2]	No	No	***No***
2.2.3.1	Type (pulse air, air pump, etc.):	NA	NA	***NA***
2.2.4	**EGR: yes/no**[2]	NA	NA	***NA***
2.2.4.1	Characteristics (cooled/uncooled, high pressure/low pressure, etc.):	NA	NA	***NA***
2.2.5	**Particulate trap: yes/no**	NA	NA	***NA***
2.2.5.1	Dimensions and capacity of the particulate trap	NA	NA	***NA***
2.2.5.2	Type and design of the particulate trap	NA	NA	***NA***
2.2.5.3	Location (places and max/min distance(s) from engine):	NA	NA	***NA***
2.2.5.4	Method or system of regeneration, description, and/or drawing:	NA	NA	***NA***
2.2.5.5	Normal operating temperature (K) and pressure (kPa) range:	NA	NA	***NA***
2.2.6	**Other systems: yes/no**	NA	NA	***NA***
2.2.6.1	Description and operation:			
3.	**Fuel feed**			
3.1	**Feed pump**			
	Pressure[1] and/or char. diagram (kPa):	550 ± 117	550 ± 117	***550 ± 117***

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1.	**Descrip. of engine**	IND (65)	740 (66)	***374 HEX*** ***(67)***
3.2	**Injection system**			
3.2.1	**Pump**			
3.2.1.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	***Caterpillar Inc.***
3.2.1.2	Type(s):	Part no. 2530616	Part no. 3556110	***Part no. 2530616***
3.2.1.3	Fuel Delivery:			
a	rated mm3	348	277	***313***
b	rated rpm	2100	1800	***1600***
c	pk tq mm3	398	337	***339***
d	pk tq rpm	1400	1350	***1400***
e	On eng./on pump bench[2]:	On engine	On engine	***On engine***
3.2.1.4	**Injection advance**			
3.2.1.4.1	Injec. adv. curve[1]:	Electronic	Electronic	***Electronic***
3.2.1.4.2	Timing[1]:	Electronic	Electronic	***Electronic***
3.2.2	**Injection piping**			
3.2.2.1	Length (mm):	NA	NA	***NA***
3.2.2.2	Internal diam. (mm):	NA	NA	***NA***
3.2.3	**Injector(s)**			
3.2.3.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	***Caterpillar Inc.***
3.2.3.2	Type(s):	Part no. 2530616	Part no. 3556110	***Part no. 2530616***
3.2.3.3	Opening press.[1] or charac. diag. (kPa):	37,921 ± 2,100 kPa	37,921 ± 2,100 kPa	***37,921 ± 2,100 kPa***
3.2.4	**Governor**			
3.2.4.1	Make(s):	Caterpillar Inc.	Caterpillar Inc.	***Caterpillar Inc.***
3.2.4.2	Type(s):	Electronics group part no. 5197820	Electronics group part no. 5503328	***Electronics group part no. 5474399***
3.2.4.3	Spd. where cut-off st. und. full ld (rpm)[1]:	2100 ± 10	1800± 10	***1600 ± 10***
3.2.4.4	Maximum no-load speed (rpm)[1]:	1980 +10/-190	2100 ±10	***1800 ± 10***
3.2.4.5	Idling speed (rpm)[1]:	700 +710/-110	700 ±10	***800 ± 10***
3.3	**Cold Start System[3]**			
3.3.1	Make(s):	NA	NA	***NA***
3.3.2	Type (s):	Ether Aid	Ether Aid	***Ether Aid***
3.3.3	Description:	Ether injection into the intake manifold	Ether injection into the intake manifold	***Ether injection into the intake manifold***
4.	**Valve Timing**			
4.1	Max. lift and angl in dead cntrs or eq. data:	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)	***15.6 mm Max. Intake Lift; 13.7 mm Max. Exhaust Lift (Cold Lash)***
4.2	~~Reference and/or~~ setting ranges[2]:	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC	***Intake Opening: 324.4 deg. ATDC Intake Closing: 564.0 deg. ATDC Exhaust Opening: 121.2 deg. ATDC Exhaust Closing: 372.2 deg. ATDC***

[1] - Specify the tolerance.
[2] - Strike out what does not apply
[3] Cold start aids:

Appendix 2 - ESSENTIAL CHARACTERISTICS OF THE ENGINE FAMILY

1.	**Common parameters:**			
1.1	Combustion cycle:	4 stroke	4 stroke	***4 stroke***
1.2	Cooling medium:	water	water	***water***
1.3	Method of air aspir:	Turbocharged air to air aftercooled	Turbocharged air to air aftercooled	***Turbocharged air to air aftercooled***
1.4	Comb. cham. type/des.	Quiescent - Bullet Nose Crater	Quiescent - Bullet Nose Crater	***Quiescent - Bullet Nose Crater***
1.5	Valve and porting-config., size, and num.	crossflow, 2 intake & 2 exhaust valves/cylinder Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	crossflow, 2 intake & 2 exhaust valves/cylinder Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.	***crossflow, 2 intake & 2 exhaust valves/cylinder Intake valve: 47.0 mm dia. Exhaust valve: 41.81 mm dia. Intake port: 41.0 mm dia. Exhaust port 36.5 mm dia.***
1.6	Fuel system	Direct Injection	Direct Injection	***Direct Injection***
1.7	Eng. Manag. Systems			
	Prf. of ident. pursuant to dr. #'s:			
1.7.1	Chrg. cooling system:	Supplied by OEM	Supplied by OEM	***Supplied by OEM***
1.7.2	Exst. gas recirc.[1]	Caterpillar Inc.	Caterpillar Inc.	***Caterpillar Inc.***
1.7.3	Water inj./emul.[1]:	NA	NA	***NA***
1.7.4	Air injection[1]:	NA	NA	***NA***
1.8	Exhaust. after-treatment system[1]:	Caterpillar Inc.	Caterpillar Inc.	***Caterpillar Inc.***
	Prf. of ident. ratio:			
2.	**Engine Family Listing**			
2.1	Name of engine family:	CPXL15.2ESW	CPXL15.2ESW	***CPXL15.2ESW***
2.2	**Spec. of eng. in fam:**			
a	Engine Type	55469	62061	***63999***
b	No. of cylinders	6	6	***6***
c	Rated Speed (rpm)	2100	1800	***1600***
d	Fuel del. per stroke @ rated (mm3)	444	335	***313***
e	Rated Net Power (kW)	348	277	***366***
f	Maximum power speed (min^{-1})	2100	1800	***1600***
g	Maximum net power (kW)	444	335	***366***
h	Max. Torque Speed (rpm)	1400	1350	***1400***
i	Fuel del. per stroke @ max. torque (mm3)	398	337	***339***
j	Max. Torque (Nm)	2719	2320	***2387***
k	Low Idle Speed (rpm)	700	700	***800***
l	Cylin. displ. (in % of parent eng.)	100%	100%	***100%***

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